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**DRAFT SITE INSPECTIONS: SITES PA-16 AND PA-18 AND REMEDIAL  
INVESTIGATION WORK PLAN: SITE PA-18**

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A Report Prepared for

Department of the Navy  
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Naval Facilities Engineering Command  
900 Commodore Drive  
San Bruno, California

**DRAFT**  
**SITE INSPECTIONS: SITES PA-16 AND PA-18 AND**  
**REMEDIAL INVESTIGATION WORK PLAN: SITE PA-18**  
**NAVAL STATION, TREASURE ISLAND**  
**HUNTERS POINT ANNEX**  
**SAN FRANCISCO, CALIFORNIA**

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by

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## 1.0 INTRODUCTION

This report presents the results of the site inspections (SIs) conducted at sites PA-16 and PA-18 at the Naval Station, Treasure Island, Hunters Point Annex (HPA), San Francisco, California (Plate 1). The work plan for these site inspections is presented in the *Site Inspection Work Plan, Sites PA-16 and PA-18* (HLA, 1990a).

Illegal waste management practices are alleged to have occurred at Sites PA-16 and PA-18 (Plate 2) between 1976 and 1986 as a result of Triple A Machine Shop (Triple A) activities during the period of their lease (*San Francisco District Attorney's Office [SFDA], 1986*). In 1988, HLA conducted a preliminary assessment (PA) of these sites (HLA, 1989a). The PA consisted of compiling existing data for each site to identify past waste management practices, to assess the nature of resulting contamination, if any, and to assess possible migration pathways, potential receptors, and potential public health threats.

The objectives of the SIs at Sites PA-16 and PA-18 were to:

- Assess the existing or suspected soil and groundwater contamination identified in previous investigations
- Evaluate groundwater chemistry and flow conditions
- Further identify likely migration pathways and potential receptors for contaminants
- Assess each site for inclusion in the Navy's Remedial Investigation (RI) program.

Section 2.0 of this report summarizes background information for HPA. A facility description, summaries of previous investigations at sites PA-16 and PA-18, and descriptions of HPA geology and hydrogeology are presented. Site descriptions and the SIs conducted at sites PA-16 and PA-18 are described in Sections 3.0 and 4.0,

respectively. Summaries of the results of each SI and recommendations for additional action are also included in these sections. Section 5.0 presents the quality assurance/quality control (QA/QC) assessment of the analytical results of soil and groundwater. A remedial investigation work plan for Site PA-18 is included in Section 6.0. References are included in Section 7.0.

## **2.0 BACKGROUND**

### **2.1 HPA Description**

HPA is in southeastern San Francisco at the tip of the Hunters Point peninsula that extends eastward into San Francisco Bay (Plate 1). The Navy property encompasses 965 acres; of these, 522 acres comprise the on-land facility and the remainder is a portion of San Francisco Bay. The facility is bounded on three sides by San Francisco Bay and on the fourth by the Hunters Point District, an area of public and private housing and commercial and/or industrial buildings. The northern and eastern shores of HPA are developed with drydock and berthing facilities for ship repair. The southern shore is primarily fill.

Hunters Point has been operated as a shipyard since 1869. Private industry owned or leased the property until 1941 when the Navy took possession. The Navy operated HPA until the shipyard was decommissioned in 1974, and in 1976 leased portions of the facility to Triple A. Triple A occupied most of the facility until its lease expired in 1986.

### **2.2 Previous Investigations**

Two previous reports provided qualitative information regarding Sites PA-16 and PA-18. A 1986 document by the SFDA presented declarations by several persons onsite during Triple A's occupancy (*SFDA, 1986*), and provides much of the available qualitative evidence of hazardous waste disposal by Triple A. A fence-to-fence survey of aboveground disposal (*ERM-WEST, 1988*) qualitatively identified potential contaminants throughout HPA. The contents of these reports are discussed in Section 3.0 for Site PA-16 and Section 4.0 for Site PA-18.

The verification study conducted in 1987 (*EMCON Associates, 1987*) provided quantified data regarding potential contamination at Site PA-18. This study, performed to verify the presence of contamination at specified sites, consisted of drilling shallow soil borings and collecting soil samples for chemical analysis at Site PA-18 in 1987. No groundwater monitoring wells were installed. The results of this study are discussed in Section 4.0.

Previous reconnaissance studies performed by HLA (*HLA, 1990b*) included geophysical and lithologic data from test pits indicating the possible presence of sand blast waste at Site PA-18. In addition, an RI is currently being performed at IR-7 to the northeast of PA-18. During Phase 2A of field investigation activities for the RI, one boring was drilled at Site PA-18 and soil samples were collected and analyzed. Details of this investigation are presented in Section 4.1.

Prior to performance of this SI, no chemical or geologic data were available for Site PA-16. Groundwater chemistry and flow conditions had not been addressed for either of these PA sites.

### 2.3 Geology

Geologic logs of soil borings and groundwater monitoring wells installed at HPA have been used to develop an understanding of subsurface stratigraphy at the facility. Eight geologic units have been identified at HPA and are described in Appendix A.

The oldest geologic unit is bedrock of the Franciscan complex. The bedrock is overlain in some areas by slope debris and ravine fill and/or undifferentiated sedimentary deposits of consolidated sands and clays, which are in turn overlain by estuarine deposits of clay, silt, sand, and peat, collectively termed "Bay Mud Deposits" (Bay mud). In some areas, undifferentiated upper sands overlie the Bay mud. These



sands may be present from dredging activities or may be native in origin in some areas. In most areas of HPA, fill overlies the above-described units. Three fill units of different origin have been identified at HPA: bedrock-derived fill consisting of Franciscan gravel and boulder-sized materials in a sand and/or clay matrix; industrial fill consisting of metal debris, wood fragments, bricks, concrete, and sandblast waste; and recently imported backfill material consisting of poorly graded sands and gravels. Each geologic unit is described in more detail in Appendix A.

#### 2.4 Hydrogeology

Information concerning the local hydrogeology at HPA has been obtained from monitoring wells installed as part of previous investigations conducted by other consultants and from current investigations conducted by HLA. These investigations have primarily evaluated the shallow aquifer at HPA. As a result, the shallow aquifer occurring in the fill materials is the best understood. Shallow groundwater in the fill materials is unconfined; the depth to the water table ranges from 2 to 14 feet below ground surface (bgs). In some areas, no shallow groundwater is encountered in the fill above the bedrock.

The undifferentiated sedimentary deposits comprise the second major aquifer beneath the site. The Bay mud occurs between the unconsolidated fill and undifferentiated sediments and may act as a 5- to 50-foot thick aquitard beneath most of the site. Groundwater may also occur in isolated sand zones within the Bay mud and in the fractured bedrock. Hydrogeologic conditions in the undifferentiated sedimentary deposits, the isolated sand zones, and the fractured bedrock and the effectiveness of the Bay mud as an aquitard have not been characterized at HPA.

Preliminary assessment of groundwater elevation data indicate that the local groundwater flow directions are quite complex because of variations in topography and the hydraulic properties of subsurface fill materials. In addition, tidal fluctuations, surface infiltration, and localized recharge from storm drains likely influence flow directions.

### 3.0 DESCRIPTION AND RESULTS OF SITE INSPECTION ACTIVITIES - SITE PA-16

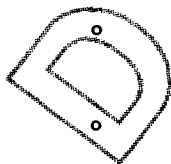
Site PA-16 is a 0.2-acre fenced and paved area at the eastern corner of H and Mahan streets near the southern tip of HPA (Plate 3). Fencing and paving are in poor condition. Previous materials reported onsite by the SFDA include 100 drums labeled "PCB-containing" oil and other drums and containers (SFDA, 1986). Previous activities on the site by Triple A reportedly included storage of drums and other containers, transformers, some flammable solids, and a 5,000-gallon tank (ERM-WEST, 1988). No information is available regarding the specific contents of the containers; it is not known how any of the material stored on the site was disposed. No drums are presently stored onsite.

#### 3.1 Previous Data Gaps

Prior to this SI, no samples had been collected at nor chemical data generated for PA-16. The only evidence of potential contamination was the reported history of disposal practices, a tank and electrical equipment stored onsite, and reported staining at various locations on the ground. A summary of reported evidence of potential contamination is presented in Table 1.

A number of data gaps were identified for Site PA-16:

- No quantified data existed concerning chemical characteristics of soil or groundwater at the site.



Depth to shallow groundwater, groundwater flow direction, and hydraulic gradient were not known.

Background soil and groundwater chemistry near this site had not been evaluated.

An SI Work Plan (HLA, 1990a) was prepared to address these data gaps.

Implementation of the plan is discussed in the following sections.

### 3.2 Drilling and Sampling Activities

Drilling and sampling activities were conducted from February 1 to February 14, 1991. Eight shallow soil borings and three shallow groundwater monitoring wells were installed to fill the data gaps identified in the work plan (HLA, 1990a). Boring and well locations are shown on Plate 3; drilling and soil sampling information is summarized in Table 2. Boring PA16B001 was drilled northeast of the site to investigate background soil conditions. Well completion details and field parameters measured during monitoring well sampling at Site PA-16 are presented in Tables 3 and 4, respectively. Field methods (drilling, monitoring well installation, sampling methods, and decontamination procedures) are described in Appendix B. All health and safety procedures were followed as specified in the Site Safety Plan (HLA, 1988b) and the Site PA-16 Job Safety Plan, which was approved and signed by the HLA Program Safety Officer on January 18, 1991.

The borings were located and drilled, and the soil samples were collected as described in the SI Work Plan (HLA, 1990a) with the following exceptions:

- No soil samples were collected from Monitoring Well PA16MW17A; instead, 2 soil samples were collected from Boring PA16B017B located approximately 5 feet from the well. Boring PA16B017B was the originally planned location for Monitoring Well PA16MW17A; the boring was abandoned at a depth of 6.5 feet because a greenstone boulder was encountered, resulting in drilling refusal.
- One shallow soil sample was collected from Boring PA16B018A and a second deeper soil sample was collected from Monitoring Well PA16MW18A less than 5 feet away. Boring PA16B018A was the originally planned location for Monitoring Well PA16MW18A; the boring was abandoned at a depth of 7 feet because refusal was encountered.
- Shallow soil samples were to be collected from a depth of 0.5 foot bgs (HLA, 1990a); however, because of the presence of asphalt and sand and gravel fill at shallow depths at Site PA-16, soil samples were generally collected from depths ranging from 0.75 to 2.25 feet bgs. The shallow samples collected from Borings PA16B002 and PA16B003 were from depths of 3.75 and 5.75 feet bgs, respectively; no soil samples were

recovered above these depths. Also, no soil was recovered from sample intervals in some borings because of the presence of boulder fill material; therefore, continuous sampling could not be performed from the ground surface to the total depth of each boring.

### **3.3 Site Hydrogeology**

#### **3.3.1 Geology**

Four geologic units were encountered at Site PA-16. Geologic logs and well completion details for all borings and wells are included in Appendix C. Geologic units are described in more detail in Appendix A.

Bedrock-derived fill (Qaf) underlies Site PA-16 and is mostly composed of gravel- to boulder-sized material within a sand and/or clay matrix. Bedrock-derived fill was encountered to depths as great as 29.75 feet. With the exception of Boring PA16B003, fill (Qaf) was encountered to the total depth of each boring, which ranged from 6.5 to 20.5 feet. Bedrock-derived fill material encountered in Borings PA16B005, PA16B017B, and PA16MW17A contained trace amounts of glass fragments and wood debris, indicating the presence of industrial fill (Qaif). Because of its limited occurrence, industrial fill is included with the bedrock-derived fill and is not shown as a distinct lithologic unit on the boring logs. Traces of shell fragments were also present in the bedrock fill. Bay mud (Qbm) containing shell fragments was encountered in Boring PA16B003 from a depth of 29.75 feet bgs to the total depth of 31 feet bgs.

At Boring PA16B001, drilled as a background boring approximately 260 feet northeast of Site PA-16, poorly graded fine- to medium-grained sand containing shell fragments was encountered to the total depth of 8 feet. The description of this sand unit most closely matches the general description of the undifferentiated upper sands

(Quus) unit. These sands were probably dredged from the bay and represent fill material. No other geologic units were encountered at the site.

### **3.3.2 Hydrogeology**

Shallow groundwater at Site PA-16 occurs within fill; the depth to groundwater at Site PA-16 was approximately 7.2 feet bgs. Water-level elevations measured on April 1, 1991 are presented and contoured on Plate 3. Based on these water-level contours, the local groundwater flow direction at Site PA-16 appears to be to the southwest at a gradient of approximately 0.0033 foot/foot. This interpretation is based on one round of water levels collected after well development and may not reflect variations resulting from seasonal or tidal influences.

### **3.4 Analytical Results**

This section summarizes the analytical results for soil and groundwater samples collected from Site PA-16 as part of the SI activities. Soil and groundwater samples were analyzed using the methods presented in Tables 5 and 6, respectively.

Groundwater pH was measured in the field during monitoring well sampling; results are presented in Table 4. A quality assurance/quality control (QA/QC) assessment of the chemical data is summarized in Section 5.0; the cursory data validation and the full Contract Laboratory Program (CLP) QA/QC validation reports are presented in Appendix D. Results presented in this section are based on validated data to the extent available at the time of report preparation.

Tables 7 and 8 (soil) and 9 (groundwater) list each sample and the analytical results by analytical method performed. Chemicals detected in one or more samples are listed for each sample; chemicals not detected in any sample are not listed in these tables. Laboratory-assigned qualifiers and qualifiers assigned during subsequent

validation are included. A complete list of chemical analytes for each analytical method can be found in the references provided in Tables 5 and 6.

Tables 10 and 11 (soil) and 12 (groundwater) present the minimum and maximum concentrations for organic and inorganic chemicals detected in environmental samples from Site PA-16. Available validation results are incorporated in these tables.

#### 3.4.1 Soil

Eighteen soil samples from 11 boring and well locations were collected for analysis (Plate 3). Tables 7 and 8 list the organic and inorganic compounds detected in each soil sample, respectively. Summaries of the organic and inorganic analytical results for soil samples are presented in Tables 10 and 11, respectively.

##### Volatile Organic Compounds (VOCs)

Toluene was detected in 16 soil samples at concentrations ranging from 3.3 to 200 micrograms per kilogram ( $\mu\text{g}/\text{kg}$ ). The detection of toluene is most likely due to suspected field contamination associated with the use of electrical tape to seal soil sample tubes, as discussed in Section 5.0. No other VOCs were detected in soil samples from Site PA-16.

##### Semivolatile Organic Compounds (SOCs)

Polynuclear aromatic hydrocarbons (PNAs) were detected in samples from Borings PA16B003 and PA16B004. Phenanthrene concentrations were estimated below the contract-required quantitation limit (CRQL) at a concentration of  $270 \mu\text{g}/\text{kg}$  at Boring PA16B003 in a sample from 10.25 feet bgs and at a concentration of  $290 \mu\text{g}/\text{kg}$  at Boring PA16B004 in a sample from 1.75 feet bgs. In addition, fluoranthene and pyrene were detected at Boring PA16B004 in a sample from 1.25 feet bgs at

concentrations of 460 and 440  $\mu\text{g/kg}$ , respectively. No other SOCs were detected at Site PA-16.

#### TPH as Diesel

TPH as diesel was detected in 11 of 18 soil samples at concentrations ranging from 25 to 310 milligrams per kilogram ( $\text{mg/kg}$ ); it was detected at concentrations at or above 100  $\text{mg/kg}$  in the following samples: Boring PA16B018A at a depth of 1.25 feet bgs (310  $\text{mg/kg}$ ); Boring PA16B003 at a depth of 10.25 feet bgs (230  $\text{mg/kg}$ ); and Borings PA16B005 and PA16B006 at depths of 1.25 feet bgs (100 and 150  $\text{mg/kg}$ , respectively).

#### Total Oil and Grease (TOG)

TOG was detected in 15 of the 18 soil samples collected at Site PA-16, at concentrations ranging from 26.7 to 261  $\text{mg/kg}$ . The TOG concentration in eight of the samples was below the reporting limit and qualified by the laboratory as estimated. A maximum concentration of 261  $\text{mg/kg}$  was detected at Boring PA16B018A at a depth of 1.25 feet bgs.

#### Polychlorinated Biphenyls (PCBs) and Pesticides

No pesticides or PCBs were detected at the site.

#### CLP Metals and pH

Twenty-three metals were detected in soil samples from the site; 17 metals were present in all 18 samples. Beryllium and cadmium were detected in 17 out of 18 soil samples. Traces of mercury were detected in 9 soil samples. Silver was detected in both samples collected from Boring PA16B004 and selenium in the shallow sample from Boring PA16B005. Molybdenum was detected twice, in the shallow samples from Borings PA16B001 and PA16B004. Soil pH ranged from 7.7 to 9.1.



#### Other Analytes

Cyanide, hexavalent chromium, and TPH as gasoline were not detected in site soil samples.

#### 3.4.2 Groundwater

Five groundwater samples, including two duplicates, were collected from monitoring wells and analyzed for the organic and inorganic parameters summarized in Table 6. A list of the inorganic compounds detected in each groundwater sample is presented in Table 9. A summary of the inorganics detected in groundwater is presented in Table 12.

#### Organic Compounds

No organic compounds were detected in any groundwater samples from monitoring wells at Site PA-16.

#### CLP Metals

Eleven metals were detected in the groundwater samples. Seven metals, including the major elements calcium, magnesium, manganese, potassium, and sodium, and the trace metals barium and nickel, were detected at each well. Numbers of detections and ranges of values are presented in Table 12. Nickel was detected at concentrations ranging from 15.6 to 63 micrograms per liter ( $\mu\text{g/l}$ ). Barium was detected at concentrations ranging from 26.6 to 103  $\mu\text{g/l}$ . Molybdenum was detected in samples from two wells at concentrations ranging from 41.5 to 85.9  $\mu\text{g/l}$ . Silver was detected in both groundwater samples from Monitoring Well PA16MW16A at concentrations of 13.4 and 9.2  $\mu\text{g/l}$ . Aluminum was detected in one sample from Monitoring Well PA16MW16A at a concentration of 322  $\mu\text{g/l}$ , and in Monitoring Well PA16MW17A at 123  $\mu\text{g/l}$ . Cobalt was detected in one sample from Monitoring Well PA16MW16A at 6.1  $\mu\text{g/l}$ .

### Other Analytes

Cyanide and hexavalent chromium were not detected in groundwater samples.

### **3.5 Evaluation of Migration Pathways and Potential Receptors**

One of the objectives of the SI for Site PA-16 is to further identify migration pathways and potential receptors for chemicals presents at the site. General potential exposure pathways discussed in the Preliminary Assessment for Sites PA-12 through PA-18 (HLA, 1989a) included ingestion of or dermal contact with soil by onsite workers, inhalation of chemicals as vapors or adsorbed to particulates, ingestion of groundwater and ingestion of or contact with surface water. Ingestion of groundwater was not considered a primary exposure pathway because of limited potential for use of groundwater as a drinking water source. Pathways related to surface water were also not considered important because surface water flows are primarily restricted to the storm sewer system.

At Site PA-16, site inspection results support a conclusion that migration via groundwater and subsequent exposure of human or environmental receptors is unlikely, based on the absence of organic compounds and the low concentrations of trace inorganics in groundwater. Groundwater concentrations are below primary maximum contaminant levels (MCLs) for aluminum, barium, nickel, and silver. MCLs have not been established for cobalt and molybdenum.

Ingestion of soil, dermal contact with soil, and inhalation of vapors or particulates represent potential exposure pathways to onsite workers or hypothetical future onsite residents. Inhalation of vapors is not considered a likely or important pathway of exposure because of the absence of VOCs in groundwater and soil. Inhalation of particulates may represent an exposure pathway; however, this potential

pathway is considered less significant than and represented by the soil ingestion and dermal contact pathways described below. In addition, the likelihood of chemical releases in the form of particulates is partially limited by the pavement at PA-16.

To assess the potential health threat posed by ingestion of soils and dermal contact with the chemicals identified at PA-16, a screening-level human health risk evaluation was performed for the site. The evaluation assumes potential ingestion of soils and dermal contact with soils by hypothetical future onsite residents as likely "worst-case" scenarios. Methodology for the analysis is presented in Appendix E. The selection of chemicals considered and results of the evaluation are discussed in Section 3.6.

### 3.6 Discussion

Results of the SI for Site PA-16 indicate the presence of TPH as diesel, TOG, PNAs, and metals in soil samples, and 11 metals in groundwater.

TOG levels measured in soils are less than the concentration of 500 mg/kg suggested by the Navy as the criteria for defining the areal extent of TOG contamination; this issue was discussed at a meeting on June 4, 1991 attended by representatives of the U.S. Environmental Protection Agency (EPA) and California Department of Health Services (DHS, now the Department of Toxic Substances Control). At that meeting, EPA stated that investigative levels should consider the individual components of oil and grease relative to risk. Three individual compounds which are constituents of oil and grease and diesel were identified in site soil samples: phenanthrene, fluoranthene, and pyrene. A screening-level assessment of the potential threat to human health associated with the occurrences of these compounds at the site is presented in Appendix E. This assessment assumes exposure to these compounds via

concentrations do not present a health risk to humans. In addition, these compounds occurred in only two soil samples at the site.

The TPH as diesel levels measured at the site are well below soil cleanup levels commonly used at other sites in San Francisco. The California Regional Water Quality Control Board, San Francisco Bay Region (RWQCB) uses the Leaking Underground Fuel Tank (LUFT) Field Manual (*LUFT Task Force, 1988*) as a guidance document for addressing releases of petroleum hydrocarbons to soil and groundwater. Previously, the RWQCB has indicated that remediation could be limited to soil with concentrations of TPH as diesel above 1,000 mg/kg. This level may not be appropriate for sites where individual petroleum hydrocarbons are detected in soil at levels not protective of human health. However, the three PNAs identified in site soils do not occur at concentrations considered to present human health risks, as discussed for TOG above and in Appendix E. In addition, since no organics were detected in groundwater, the petroleum hydrocarbons at Site PA-16 are not expected to present a health risk to humans.

The only VOC detected in soil samples from Site PA-16 was toluene. The detections of toluene are not considered representative of environmental conditions for the following reasons: the absence of TPH as gasoline and VOCs similar to toluene such as benzene, xylenes, and ethylbenzene; the apparently ubiquitous presence of toluene regardless of sample depth and location; and the possibility of migration of toluene into soil samples from electrical tape used to seal sample tubes.

The 23 metals detected in site soils include common major elements such as aluminum, calcium, iron, magnesium, manganese, and sodium; the presence of the metals is not considered indicative of site-related contamination. The significance of measured concentrations of the remaining 16 trace metals was evaluated by first comparing

measured concentrations to background concentrations estimated through analysis of soil sample results from sites at OU-II, as presented and discussed in the *Background Sampling Plan* (HLA, 1990c). Because most soils at PA-16 are bedrock-derived serpentinite fill materials, measured concentrations were compared to the upper limit (threshold) of background concentration estimated for serpentinite fill. Of the 16 metals, upper limit of background has been estimated for 11. Of these 11 metals, measured concentrations at PA-16 are less than the estimated upper limit of background for 6 of the metals: beryllium, chromium, cobalt, copper, nickel and vanadium (Table 11). For these metals, observed concentrations are likely representative of background conditions and not of releases. For 4 of the remaining 5 for which background has been estimated (arsenic, barium, lead and zinc), concentrations exceed the estimated upper limit in 5 or fewer samples and maximum concentrations exceed the threshold values by a factor of approximately 3 or less (Tables 8 and 11). Thus, the lateral and vertical distribution of the apparently elevated concentrations of these elements is discontinuous, and concentrations, while exceeding background, are not distinctly different from background levels. For these metals, the distribution and concentrations do not show clear evidence of releases. Cadmium concentrations exceed the estimated upper limit of background of 2.1 mg/kg in 15 samples, with maximum concentrations of 14 mg/kg. For this element, while concentrations are slightly to somewhat elevated at most locations, evidence of releases is lacking.

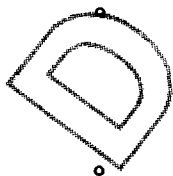
The significance of metals concentrations measured in site soils was further evaluated using risk assessment techniques. For the 10 metals for which either background has not been estimated (antimony, mercury, molybdenum, selenium, and silver) or for which at least one soil concentration exceeded the upper limit of

background (arsenic, barium, cadmium, lead, and zinc), the threat to human health was evaluated assuming exposure of a hypothetical residential population via ingestion or dermal contact with site soils. Methodology and results are presented in Appendix E. In summary, the analysis indicates that for the conservative set of assumptions used in the evaluation, a potential threat to human health may exist for 2 of these 10 metals: antimony and arsenic. However, as noted above, measured concentrations of arsenic do not appear to be significantly different from background; concentrations in 3 of 18 samples exceeded estimated upper limit of background, with the maximum value of 15.7 mg/kg approximately a factor of two above the estimated upper limit of 7 mg/kg. In addition, neither the measured concentrations or distribution of detections of either antimony or arsenic suggest releases.

As noted in Section 3.5, concentrations identified in groundwater at Site PA-16 are below the current primary maximum contaminant levels (MCLs) for drinking water for 4 of the 6 trace metals identified: aluminum, barium, nickel, and silver (Marshack, 1990). MCLs are not available for cobalt or molybdenum (Table 12).

### 3.7 Summary

The following summarizes hydrogeologic and chemical data obtained during the SI investigation performed at Site PA-16.



Four lithologic units were identified at the site: bedrock-derived fill (Qaf), industrial fill (Qaif), undifferentiated upper sands (Quus), and Bay mud (Qmb). Bedrock-derived fill was encountered from the surface to the total depths of 10 of 11 borings.

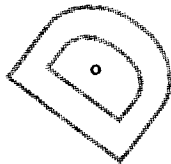
- Traces of industrial fill material (glass fragments and wood debris) were encountered within the bedrock-derived fill at three borings.
- The site is underlain by up to 30 feet of bedrock-derived fill which in turn overlies bay mud.

- There is a slight groundwater gradient toward the northeast.
- TPH as diesel was measured at concentrations above 100 mg/kg in three shallow samples and one deep sample from the borings. The distribution of TPH as diesel in soil is discontinuous.
- TOG was not detected at concentrations above 500 mg/kg in any soil samples collected at the site.
- PNAs were detected at low concentrations in two soil samples.
- No PCBs or pesticides were detected in soil samples.
- Most of the 23 CLP metals were detected in most of the Site PA-16 soil samples. Metal concentrations are within the upper limit (threshold) of background concentrations previously estimated for bedrock-derived fill at HPA sites (HLA, 1990c), for all metals except arsenic, barium, cadmium, lead, manganese and zinc. Background metal concentrations in soil have not been established at HPA for the following trace elements detected at Site PA-16: antimony, mercury, molybdenum, selenium, and silver. Soil pH is in the neutral range (7.7 to 9.1).
- No organic compounds were detected in the groundwater samples.
- Eleven metals, including 6 trace metals, were detected in groundwater samples. Metal concentrations in groundwater samples are below primary MCLs for aluminum, barium, nickel, and silver. MCLs have not been established for the trace metals cobalt and molybdenum.

### 3.8 Conclusions and Recommendations

The following conclusions are based on the results of this investigation.

- With respect to petroleum hydrocarbons, distribution is discontinuous and concentrations are only slightly elevated and generally below guidelines used in assessing the need for remediation. In addition, individual petroleum hydrocarbon constituents do not occur in soil at concentrations that pose a threat to human health, and do not occur in groundwater.



- With respect to metals, most occurrences are consistent with estimated background concentrations or are not consistently different from background. An evaluation of potential threat to human health for those metals above background levels or for which background levels have not been established suggests that the two metals antimony and arsenic may pose a threat to a hypothetical onsite residential population. However, for all metals detected, concentrations and distribution do not show evidence or patterns of releases.

On the basis of these conclusions, HLA recommends that no RI be performed at Site PA-16.

DRAFT



#### **4.0 DESCRIPTION AND RESULTS OF SITE INSPECTION ACTIVITIES - SITE PA-18**

Site PA-18 is a 3.6-acre area located near the northern tip of HPA in the paved parking lot adjacent to Earl Street west of the Sub-Base Area, Site IR-7 (Plate 4). Triple A reportedly disposed of 50,000 to 100,000 gallons of waste oil on the ground at this site, which was subsequently paved with asphalt (*SFDA, 1986*). A summary of reported evidence of potential contamination is presented in Table 13.

##### **4.1 Summary of Previous PA-18 Data**

###### **4.1.1 Verification Study**

During the verification study (*EMCON Associates, 1987*), soil samples from six shallow borings at PA-18 (Plate 4) were collected and analyzed for TPH. The samples contained high boiling point hydrocarbons characterized as either diesel, oil, or unidentified hydrocarbons at concentrations ranging from less than 10 parts per million (ppm) to 400 ppm. These data are summarized in Table 14.

###### **4.1.2 Activities Conducted during RI Activities at IR-7**

Previous geophysical and lithologic data for Site PA-18 were obtained as part of the reconnaissance phase RI at the Sub-Base Area (IR-7) (*HLA, 1990b*). Three ground-penetrating radar (GPR) profiles were performed and five shallow test pits were excavated within the boundaries of Site PA-18 (Plate 4) to evaluate the presence and/or extent of sandblast wastes at Site IR-7. All three GPR profiles showed indications of subsurface lithology changes that may suggest boundaries of sandblast waste. Of the five test pits excavated along GPR profiles IR07GP01 and IR07GP03, test pits IR07T01A and IR07T02B encountered very dark brown well-graded sand from 3.5 to 4.5 bgs. These sands were thought to be sandblast wastes; positive identification was

not made. The sands were not encountered in the other test pits, indicating an irregular distribution of the sands at this site.

HLA is currently performing a remedial investigation (RI) at Site IR-7 adjacent to and northeast of Site PA-18 (Plate 4). Borings and wells were drilled during the primary drilling phase of the RI prior to the SI at Site PA-18. Because Boring IR07B022 was drilled at Site PA-18, the lithologic and chemical data are presented as previously obtained data; the boring was drilled after the SI Work Plan was prepared. The lithologic log of Boring IR07B022 is shown on Plate 5; organic and inorganic analytical results of soil sampling are presented in Tables 15 and 16, respectively. Bedrock-derived fill was encountered beneath the surface asphalt to a depth of 7 feet; deeply weathered serpentinite bedrock was encountered beneath the bedrock fill to the total depth of the boring at 14.5 feet bgs. Four soil samples were collected and analyzed; results indicate that trace amounts of VOCs and SOCs are present. Trace amounts of pesticides were detected at a depth of 6.5 feet bgs. TOG was detected in the 3 shallow samples at concentrations ranging from 1120 to 2770 mg/kg. TPH as diesel was detected at a depth of 1.5 feet bgs at a concentration of 204 mg/kg. Analytical results for inorganics are presented in Table 16 and indicate that trace metals concentrations are below the estimated upper limit of background concentrations (HLA, 1990c and Table 11).

4.2

#### Previous Data Gaps

Prior to this SI, the following data gaps were identified for Site PA-18:

- o Sufficient data were not available to evaluate the distribution of petroleum hydrocarbons in the soil.
- o Analyses had not been performed for some compounds suspected of being present at the site.

- Depth to shallow groundwater, groundwater flow direction, and hydraulic gradients at this site were not known.
- Data to characterize groundwater chemistry were not available.
- Site background soil and groundwater chemistry had not been evaluated.

An SI Work Plan (HLA, 1990a) was prepared to address these data gaps.

Implementation of the plan is discussed in the following sections.

#### 4.3 Drilling and Sampling Activities

Drilling and sampling activities were conducted from January 28 to February 14, 1991. Eight soil borings were drilled and two shallow groundwater monitoring wells were installed at the site. Monitoring Well PA18MW08A was installed upgradient west of the Site PA-18 boundary to characterize background soil and groundwater chemistry at the site. Boring and well locations are shown on Plate 4 and drilling and soil sampling information is summarized in Table 17. Well construction details and field parameters measured during monitoring well sampling are presented in Tables 18 and 19, respectively. All health and safety procedures were followed as specified in the Site Safety Plan (HLA, 1988b) and the Site PA-18 Job Safety Plan, which was approved and signed by an HLA Program Safety Officer on January 18, 1991. Drilling, monitoring well installation, sampling methods, and decontamination procedures are described in Appendix B.

All work was completed according to the Site Inspection Work Plan (HLA, 1990a) with the following exceptions:

- Boring PA18B010 was to be converted to a 4-inch monitoring well, but groundwater was not encountered in this area.
- Shallow soil samples were to be collected from a depth of 0.5 foot bgs; however, because of the presence of asphalt and sand and gravel fill at shallow depths, soil samples were collected at depths of 1 to 2.75 feet bgs. Also, in several instances, no soil was recovered during sampling

activities, therefore, continuous sampling could not be performed to the total depth of each boring.

- o Boring PA18B002 was terminated at a depth of 12.5 feet bgs because of high (greater than 100 ppm) organic vapor analyzer (OVA) readings in the breathing zone. In addition, debris zones comprised of brick and rock were encountered below a depth of 5 feet bgs obstructing soil sample recovery. Hence, no soil samples were collected below a depth of 2.75 feet from the boring. The debris zone and the high OVA readings may be indicative of landfill disposal practices. The boring was backfilled with a bentonite cement grout slurry. No sample of the gas coming from the boring was collected.

#### 4.4 Site Hydrogeology

##### 4.4.1 Geology

Four geologic units were encountered at Site PA-18. Geologic logs and well completion details of all borings and wells are included in Appendix C.

Franciscan Formation bedrock was encountered beneath the central to southeast portions of the site where the depth to bedrock is approximately 7 to 17 feet bgs. No groundwater was encountered in borings in the area of the bedrock high shown on Plate 4. The bedrock high dips to the northwest, as shown on Cross Section A-A' (Plate 6). The bedrock is composed of deeply weathered, locally fractured olive to grayish-green serpentinite.

At Monitoring Wells PA18MW08A and PA18MW09A, 1.5 to 2 feet of undifferentiated sands (Quus) were encountered above the bedrock. The sand is composed of dark greenish-gray to light olive brown, poorly graded, fine- to medium-grained, medium dense sand containing traces of shell fragments and silt.

Bedrock-derived fill (Qaf) was encountered in each boring and overlies either the bedrock or undifferentiated sands throughout the site. The Qaf consists predominantly of Franciscan Formation greenstone and serpentinite rock fragments within a sand and/or clay matrix. Within the bedrock fill, industrial fill (Qaif) consisting of metal,

wood, brick, and glass fragments was encountered. Industrial fill was encountered at various depths in Borings PA18B001, PA18B002, PA18B003, and to a lesser extent in Borings PA18B004 and PA18B006. A trace of wood was encountered at Boring PA18B004 at a depth of approximately 2 feet bgs and brick fragments were encountered at Boring PA18B006 from a depth of 3.5 to 4 feet bgs. Brick fragments were encountered at Monitoring Well MW09A from a depth of 1 to 3.5 feet bgs. Upper and lower contacts of industrial fill were indistinguishable from bedrock fill because of intermixing. Therefore, for purposes of discussion, the fill units are combined and described as "fill".

For borings in which older geologic units were encountered beneath the fill, the fill ranged in thickness from 7 to 27 feet. Fill was present from the surface to the total depth of all other borings and was encountered at a maximum depth of 28.5 feet at Monitoring Well PA18MW08A.

#### **4.4.2 Hydrogeology**

Shallow groundwater was not encountered in the central to southeast portions of the site, in areas underlain by shallow bedrock (Plate 4).

Where no bedrock was encountered, shallow groundwater was encountered in the fill materials at depths of approximately 12 to 16 feet bgs. Because only two monitoring wells were installed at Site PA-18, the water-level elevation measured in Monitoring Well IR07MW23A at Site IR-7 was used to evaluate groundwater flow direction and gradient at Site PA-18. Although the configuration of the 3 wells is not ideal for evaluation of the flow direction and hydraulic gradient, water-level elevations obtained from the three wells on April 1, 1991, are presented and contoured on Plate 4. Based on these contours, the local groundwater flow direction within the water-bearing fill

materials appears to be to the northeast toward the bay, with a gradient of approximately 0.02 foot/foot. This interpretation is based on one round of water levels collected after well development and may not reflect variations resulting from seasonal or tidal influences.

#### **4.5 Analytical Results**

The analytical results for soil and groundwater samples collected from Site PA-18 are presented in this section. Methods used for analysis of each soil and groundwater sample are presented in Tables 5 and 6, respectively. Groundwater pH was measured in the field during sampling of monitoring wells and is presented in Table 19. A QA/QC assessment of the chemical data is presented in Section 5.0; the cursory data validation and the full CLP QA/QC validation reports are presented in Appendix D. Results presented in this section are based on validated data to the extent available at the time of report preparation.

Tables 20 and 21 (soil) and 22 (groundwater) list each sample and the analytical results by method. Chemicals detected in at least one sample are listed for all samples. Laboratory-assigned qualifiers and qualifiers assigned as a result of cursory and full CLP validation are presented for each chemical. Chemicals not detected in environmental samples are not listed in these tables. A complete list of chemical analytes for each analytical method can be found in the references provided in Tables 5 and 6.

Tables 23 and 24 (soil) and 25 (groundwater) present detected minimum and maximum organic and inorganic chemical concentrations. Available validation results are incorporated in these tables.

#### 4.5.1 Soil

Twenty soil samples were collected for analysis from 10 boring and well locations at Site PA-18 (Plate 4). Tables 20 and 21 list the organic and inorganic compounds detected in each soil sample. A summary of the organic analytical results for these soil samples is presented in Table 23; inorganic analytical results are summarized in Table 24.

##### Volatile Organic Compounds (VOCs)

Toluene was detected in 18 soil samples at concentrations ranging from 2.8 to 2,900  $\mu\text{g}/\text{kg}$ ; three concentrations were estimated. The low concentrations of toluene may be due to suspected field contamination resulting from the electrical tape used to secure the plastic caps to the soil tubes, as described in Section 5.0. Methyl ethyl ketone was detected in 2 samples at concentrations of 23 and 27  $\mu\text{g}/\text{kg}$ . Xylenes were detected in 2 samples at concentrations of 3.8 and 9,800  $\mu\text{g}/\text{kg}$ . Carbon disulfide and ethylbenzene were each detected once, in different samples, at concentrations of 7  $\mu\text{g}/\text{kg}$  and 1200  $\mu\text{g}/\text{kg}$ , respectively. No other VOCs were detected in soil samples from Site PA-18.

##### Semivolatile Organic Compounds (SOCs)

At a depth of 1 foot at Boring PA18B005, 2,4-dinitrotoluene was reported at an estimated concentration of 300  $\mu\text{g}/\text{kg}$ . No other SOC's were detected at Site PA-18.

##### PCBs and Pesticides

Estimated concentrations below the contract required quantitation limit (CRQL) of alpha-chlordane and gamma-chlordane were reported in a soil sample from Boring PA18B001 and a sample from Boring PA18B005 at depths of 8.75 feet and 1 foot bgs, respectively. In addition, an estimated concentration below the CRQL of 9.2  $\mu\text{g}/\text{kg}$  4,4'-DDT was also reported at a depth of 1 foot bgs at Boring PA18B005. A PCB mixture, Aroclor-1260, was reported at an estimated concentration below the CRQL of 78  $\mu\text{g}/\text{kg}$ .

at a depth of 1.25 feet bgs at Boring PA18B001. No other pesticides or PCBs were detected at the site.

#### TPH as Diesel

TPH as diesel was detected in 10 soil samples at concentrations ranging from 32 to 5700 mg/kg; measured concentrations exceeded 100 ppm in 8 of these samples. Maximum diesel concentrations of 5,300 and 5,700 mg/kg were detected at Boring PA18B001 at a depth of 8.75 feet bgs and at Boring PA18B003 at a depth of 6.75 feet bgs, respectively. TPH as diesel was detected at a concentration of 200 mg/kg at Boring PA18B005 at a depth of 4 feet bgs and at a concentration of 170 mg/kg at Boring PA18B004 at a depth of 1.25 feet bgs. TPH as diesel was detected at a concentration of 150 mg/kg at Boring PA18B002 at a depth of 2.75 feet bgs and at a concentration of 120 mg/kg at Well PA18MW09A at a depth of 1.75 feet bgs. TPH as diesel was also detected in the shallow samples from Borings PA18B001 and PA18B003 at concentrations of 120 and 380 mg/kg, respectively.

#### TPH as Gasoline

TPH as gasoline was detected at a concentration of 140 mg/kg at Boring PA18B003 at a depth of 6.75 feet bgs. TPH as gasoline was not detected in soil samples collected elsewhere onsite.

#### Total Oil and Grease (TOG)

TOG was detected in 18 soil samples collected at Site PA-18 at concentrations ranging from 32.8 to 49,600 mg/kg. The TOG concentration in five of the samples was below the contract required quantitation limit (CRQL) and qualified by the laboratory as estimated. The maximum concentration of 49,600 mg/kg was detected at Boring PA18B001 at a depth of 8.75 feet bgs. TOG was detected at concentrations above



500 mg/kg in samples from two other borings: at Boring PA18B004 at a depth of 6 feet bgs at a concentration of 1,230 mg/kg and at Boring PA18B005 at a depth of 4 feet bgs and a concentration of 514 mg/kg.

#### CLP Metals

Twenty-one metals were detected in soil samples from the site; 10 metals were detected in all 20 soil samples. Aluminum and cobalt were detected in 19 soil samples, antimony and potassium were detected in 18 soil samples, and chromium was detected in 17 samples. Arsenic was detected in 15 samples and traces of mercury in 12 soil samples. Beryllium was detected in 5 soil samples. Soil pH ranged from 6.7 to 8.5.

#### Other Analytes

Cyanide and hexavalent chromium were not detected in site soil samples.

#### **4.5.2** Groundwater

Three groundwater samples, including one field duplicate collected from PA18MW09A, were collected from the two monitoring wells and analyzed using the laboratory analytical methods presented in Table 6. A list of the inorganic compounds detected in each groundwater sample is presented in Table 22. A summary of the inorganics detected in groundwater is present in Table 25.

#### Organic Compounds

No VOCs, SOCs, pesticides/PCBs, TPH, or oil and grease were detected in the groundwater samples from monitoring wells at Site PA-18.

#### CLP Metals

Nine metals were detected in the groundwater samples; 5 of these metals were detected in each sample: calcium, magnesium, manganese, potassium, and sodium. Barium, cobalt, and nickel were detected in both groundwater samples from Monitoring

Well PA18MW09A. Chromium was detected in groundwater from Monitoring Well PA18MW08A at a concentration of 19.9 µg/l.

#### Other Analytes

Cyanide and hexavalent chromium were not detected in any groundwater samples.

#### 4.6 Evaluation of Migration Pathways and Potential Receptors

One of the goals of the SI is to further identify migration pathways and potential receptors. Potential exposure pathways considered during the Preliminary Assessment for Sites PA-12 through PA-18 are summarized in Section 3.5. For Site PA-18, exposure via soil pathways was considered unlikely because the site is paved. This assessment has not changed as a result of SI activities. The PA considered air a potential exposure pathway for workers or visitors to the site. Results of the SI investigation suggest that exposure to vapors is not likely to be an important pathway because of the generally low concentrations of VOCs detected in soil samples and the absence of VOCs in groundwater. Inhalation of chemicals or particulates during construction activities that may require removal of pavement may represent an exposure pathway at this site.

Pathways associated with groundwater were not considered in the PA; however, no organic compounds were detected in groundwater samples. For the four trace inorganics, groundwater is not considered a likely migration route for site chemicals; barium, chromium, and nickel concentrations are below the current primary MCLs (Table 25). A primary MCLs has not been established for cobalt.

#### 4.7 Discussion

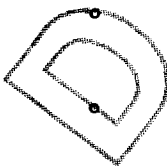
TOG concentrations exceed the investigation level of 500 mg/kg discussed at the June 4, 1991, meeting attended by EPA and DHS; measured levels suggest releases to soil at the site. TPH as diesel levels are also elevated, exceeding 1,000 mg/kg in two samples. Measured toluene concentrations are suspected to be the result of field contamination.

There is no evidence of releases to groundwater of organic compounds, including VOCs, SOCs, and pesticides/PCBs; however, the existing well network does not allow evaluation of the presence of organic compounds in groundwater in areas of elevated TOG and TPH as diesel in soil.

#### 4.8 Summary

The following discussion summarizes the hydrogeologic and analytical data obtained from previous investigations and the SI investigation performed at Site PA-18.

- Four lithologic units were encountered at the site; bedrock-derived fill (Qaf), industrial fill (Qaif), undifferentiated upper sands (Quus), and Franciscan Formation Bedrock (bedrock).
- Bedrock was encountered at shallow depths in the southeast section of the site (Plate 4). No groundwater was encountered in this area.
- A debris zone was encountered at Boring PA18B002; organic vapors emanating from the borehole were measured at over 100 parts per million (ppm) in the breathing zone, possibly indicating landfill disposal.



The groundwater flow direction appears to be northeast at an approximate gradient of 0.02 feet/foot.

TOG was detected at concentrations above 500 mg/kg in samples from three borings.

- TPH as diesel was detected at concentrations greater than 100 mg/kg in eight soil samples from six borings and wells.
- TPH as gasoline was detected in one soil sample at a concentration of 140 mg/kg.

- Low levels of dinitrotoluene, three pesticides, and Aroclor 1260 were detected below the CRQL in five samples from two borings.
- VOCs including toluene, methyl ethyl ketone, xylenes, carbon disulfide and ethylbenzene were detected in soil. Toluene is a suspected field contaminant.
- No VOCs, SOCs, or PCBs/pesticides were detected in the groundwater samples.
- Except for chromium, metal concentrations in groundwater were higher downgradient at Monitoring Well PA18MW09A than in the background Monitoring Well PA18MW08A. Chromium was not detected in Monitoring Well PA18MW09A.

#### **4.9 Conclusions and Recommendations**

##### **4.9.1 Conclusions**

The following conclusions are based on the results of this investigation:

- Results of soil analysis show elevated levels of petroleum hydrocarbons which may be indicative of releases.
- TOG and TPH as diesel were identified at elevated concentrations in soil; lateral and vertical extent have not been characterized.
- VOCs, SOCs, and PCBs/pesticides were identified in soil; extent of these chemicals has not been characterized.
- Groundwater chemistry has not been characterized in areas of high soil concentrations of TOG and TPH as diesel.
- Gas encountered during drilling Boring PA18B002 may indicate past landfill activities.
- Industrial fill material occurs within the bedrock fill; the extent and amount are not known.
- Sand blast wastes encountered in previous investigations were not encountered during SI field activities.
- The limit of the bedrock high, in areas where groundwater is not present, has not been sufficiently characterized to delineate the lateral extent of the shallow aquifer.

- Because of the relative positions of the two wells installed at Site PA-18 and the well at Site IR-7, the groundwater flow direction and gradient are not well characterized.

#### **4.9.2 Recommendations**

On the basis of these conclusions, HLA recommends that an RI be performed at Site PA-18 to further characterize the following:

- Background concentrations of metals in soil and groundwater
- Extent of petroleum hydrocarbons in soil
- Extent of VOCs, SOCs, and PCBs/pesticides in soil
- Groundwater chemistry in areas of elevated TOG and TPH in soil
- Groundwater occurrence, flow direction and gradients
- Hydraulic characteristics of the shallow aquifer
- Lateral and vertical extent of sand blast wastes.

An RI work plan is presented in Section 6.0 of this report. The work plan presents the scope of investigation necessary to fill the chemical and hydrogeologic data gaps identified at the site.

## 5.0 QUALITY ASSURANCE/QUALITY CONTROL ASSESSMENT

The chemical data presented in this report for PA-16 and PA-18 have been reviewed for accuracy and precision. All soil and groundwater chemistry data have been validated and appropriate qualifiers assigned to each detected analyte. The validation procedures and a summary of the validation of the analytical results are presented in Appendix D. Chemical analyses performed according to the CLP statements of work (EPA, 1988a,b) have been reviewed and qualified according to EPA guidelines (EPA, 1988c,d). Non-CLP analytical results were reviewed and qualified in a manner similar to the CLP data; if no guidance was available from the CLP documents (EPA, 1988c,d), data quality criteria described in the Quality Assurance Project Plan (HLA, 1988a) were used.

Most of the data presented in this report have been assigned one of the following four qualifiers, as defined in the Quality Assurance Project Plan (HLA, 1988a):

- A - Acceptable (data meet all QC criteria)
- J - Estimate, qualitatively correct but quantitatively suspect
- R - Reject, data not suitable for any purpose
- U - Not detected

The assignment of these four qualifiers reflects the first level of validation, termed " cursory " validation (HLA, 1988a), which includes a review of laboratory blanks, field blanks, laboratory duplicates, field duplicates, laboratory spikes, surrogate spikes, and holding times. A more intensive "full-CLP" validation (HLA, 1988a), including review of GC/MS timing parameters, calibration, compound identification and quantitation, internal standards performance, reporting limits, and tentatively identified compounds has been completed on about 10 percent of the samples. Samples subjected to the "full-CLP" validation have been assigned a "V" qualifier.

In addition to these four qualifiers, an "F" qualifier is used to indicate that laboratory or field contamination may have caused the positive results. This is used for results where the contaminant has not been found in the associated field or laboratory blank samples, but is suspected. In addition, qualifiers may be assigned by the laboratory.

A summary of the data review process used for this report is as follows:

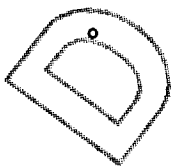
- o Sample result integrity is verified by tracking sample and sample results through field chain of custody records, laboratory run logs, laboratory worksheets, and raw data.
- o Sample results are first qualified by laboratory blank data and then by field blank data. Analytes identified in any of the blanks and also in the sample results are qualified as not detected (false positives) unless the sample results are five times greater than the largest concentration observed in the associated blanks. Common laboratory organic contaminants (methylene chloride, acetone, phthalates, etc.) are an exception to this criteria and must appear at ten times the highest concentration observed in any of the blanks.
- o Duplicate results (matrix, blank spike, matrix spike) are reviewed and relative percent differences (RPD) are calculated and compared to CLP and project criteria. If RPD criteria are exceeded, the data are qualified.
- o Spike results and percent recovery (%R) (for matrix spikes, blank spikes, and surrogate spikes) are reviewed and compared to CLP and project criteria. If percent recovery criteria are exceeded, the data are qualified.
- o Holding times are analyzed and compared to EPA guidelines. Results with holding time exceedances are qualified.

The results of the QA/QC assessment presented in Appendix D indicate that most of the data are accurate, precise, and of good quality. The exceptions are listed below:

Several results for mercury, pH, VOC, and SOC analyses are qualified as estimated (J) due to holding time exceedances.

- o Copper, iron and zinc results for PA-16 groundwater samples and barium, copper, iron, potassium, and zinc results for PA-18 groundwater samples were qualified as nondetected (U) due to field blank contamination.

- o Most molybdenum results for soil samples and results for antimony, barium, beryllium, cobalt, silver, sodium and zinc in several soil samples were qualified as non-detected (U) due to laboratory blank contamination. Molybdenum, copper, silver and zinc results in several groundwater samples were also qualified as non-detected (U) due to laboratory blank contamination.
- o All positive methylene chloride, acetone and heptachlor results were qualified as non-detected (U) due to the presence of these compounds in several laboratory blanks. All positive bis-2 ethylhexyl phthalate results were also qualified as non-detected (U), because of the occurrence of this compound as a common laboratory contaminant; however, bis-2 ethylhexyl phthalate was not found in any of the laboratory blanks.
- o All positive toluene results were qualified with an "F" qualifier indicating that laboratory or field contamination may have caused the positive results. Toluene is a common laboratory contaminant and has been identified as a constituent of the black electrical tape used to seal caps onto soil tubes. The practice of wrapping capped soil tubes with electrical tape has been discontinued at HPA.
- o Several VOC and pesticide results and two TPH gasoline results are qualified as estimated (J) and the VOC analysis for one sample was rejected (R) due to surrogate spike recovery problems.
- o All pesticide/PCB results for PA-18 soil samples are qualified as J due to linearity problems in the initial calibration.
- o All soil sample results for antimony, and several soil sample results for calcium, chromium, manganese, and selenium are qualified as estimated (J) due to poor percent recoveries in matrix spike analyses. Selenium and thallium are qualified as estimated (J) in one PA-16 groundwater sample due to poor percent recoveries in matrix spike analyses.
- o Several results for aluminum, antimony, copper and zinc in soil samples are qualified as estimated (J) due to high relative percent differences in matrix duplicate analyses. Aluminum results for PA-16 water samples are qualified as estimated (J) due to field blank contamination.



- o Calcium and magnesium results in one PA-16 water sample and calcium, manganese and zinc in one PA-18 soil sample were qualified as estimated (J) due to ICP-serial dilution relative percent difference quality control criteria exceedances.
- o VOC results for one sample are qualified as estimated (J) due to relative percent difference problems with matrix spike/matrix spike duplicate analyses.



## **6.0 REMEDIAL INVESTIGATION WORK PLAN - SITE PA-18**

### **6.1 Introduction**

The hydrogeology and soil and groundwater chemistry at Site PA-18 have been evaluated; it is recommended the site be included as part of the Remedial Investigations/Feasibility Studies (RI/FS) being performed at HPA. This sampling plan has been developed by HLA to address the data gaps identified at the site. Background information about Site PA-18, previous investigations by others, and HLA's reconnaissance activities and SI investigation are presented in previous sections of this report. In subsequent sections the existing data gaps, primary phase RI, analytical program, and field procedures are presented. Also presented are QA/QC procedures, the site safety plan, community relations, reports and submittals, and the operational plan.

### **6.2 Data Gaps**

Petroleum hydrocarbons, as indicated by high concentrations of TOG and TPH as diesel in soil, are the primary chemicals of concern at Site PA-18. Trace concentrations of other organic chemicals (VOCs, SOCs, and PCB/pesticides) and various metals were also detected in the soil.

The data gaps identified for Site PA-18, and which are proposed to be addressed in the RI, are:

- The lateral and vertical extent of TOG and TPH as diesel in soil
- Possible presence of VOCs, SOCs, PCB/pesticides and various metals in areas or at depths not yet evaluated
- Groundwater chemistry in areas where high concentrations of TOG and TPH as diesel have been detected in the soil
- Groundwater occurrence, flow direction, and gradient
- Hydraulic characteristics of the shallow aquifer

- Nature and extent of the traces of industrial fill material at several borings, including, in particular, Boring PA18B002.
- The lateral and vertical extent of sand blast wastes.

### 6.3 Primary Phase RI

The proposed approach for the primary phase of the RI to address the data gaps identified for Site IR-18 includes the following activities:

- Ten soil borings will be drilled approximately 2 feet into the Bay mud or until refusal is encountered in bedrock. Proposed boring locations are shown on Plate 7.  
  
Proposed Borings IR18B012, IR18B014, IR18B017, and IR18B019 are adjacent to borings in which the soil contained high concentrations of TOG and TPH as diesel. Soil samples from these borings will be collected and analyzed to evaluate the vertical extent of chemicals previously detected at these sites. The remaining soil borings will be drilled and soil samples collected and analyzed to evaluate soil chemistry and fill data gaps where no soil chemistry data exist.
- Groundwater samples from Borings IR18B011, IR18B012, IR18B013, and IR18B014, will be collected and analyzed to evaluate groundwater chemistry at these locations. Borings IR18B012 and IR18B014 are adjacent to Borings PA18B002 and PA18B003, respectively, where high concentrations of TOG and TPH as diesel were detected during the SI investigation. Borings IR18B011 and IR18B013 are located in areas where groundwater chemistry has not been evaluated.
- Two shallow aquifer monitoring wells (IR18MW21 and IR18MW22; Plate 7) will be drilled and installed and water and soil samples collected and submitted for chemical analysis to evaluate groundwater conditions and vertical distribution of chemicals in soil. The wells will be screened from approximately 5 feet above to 15 feet below the water table. The total completion depth of these wells will be approximately 25 to 30 feet bgs.  
  
Proposed Monitoring Wells IR18MW21 and IR18MW22 are adjacent to Borings PA18B001 and PA28B005 where high concentrations of TOG and TPH as diesel were detected during the SI investigation. Soil and groundwater samples will be analyzed to evaluate the vertical extent of chemicals in the soil and to monitor the groundwater chemistry at these locations.
- Water level measurements from Monitoring Wells IR18MW21 and IR18MW22 and wells installed prior to RI activities will be evaluated to

determine the groundwater flow direction and hydraulic gradient at the site.

- A southeast to northwest trending trench will be dug to evaluate the extent of the sand encountered in test pits excavated during reconnaissance phase RI activities (Plate 7). The sands will be logged to evaluate whether or not they are sand blast wastes; samples may be collected and sent to the laboratory for analysis.

#### **6.4 Analytical Program**

All groundwater and soil samples will be analyzed for TOG and TPH as diesel. Groundwater samples collected from borings and monitoring wells, and unsaturated soil samples will be analyzed for VOCs, SOCs, PCBs/pesticides, and metals. In addition, the pH of the soil samples will be measured by the laboratory and the pH of the groundwater samples will be measured in the field. Groundwater samples will also be analyzed by the laboratory for major anions. All laboratory analyses will be performed by a laboratory certified by the State of California and by the U.S. Navy for the specific analyses requested, and capable of doing CLP analyses. Analytical methods used for analysis of soil and groundwater samples are presented in Tables 5 and 6, respectively.

Based on field screening of soil samples for radiation, some samples may be sent to laboratories certified to perform specific analyses for individual radionuclides. For radiation readings significantly above background, a portion of the soil sample will be submitted to the analytical laboratory for gross alpha and beta analyses using EPA Test Method 9310 and gamma analyses using gamma spectroscopy. Groundwater samples will be submitted for radiological analysis if soil samples from the borings indicate the presence of radioactivity. Personal protection screening methods for radiation will be described and included as an addendum to the existing safety plans for Site PA-18 and HPA.

## **6.5 Field Procedures**

Planned characterization activities for the RI at Site PA-18 include:

- Conducting geophysical surveys
- Drilling and sampling of soil borings
- Installation and developing of new groundwater monitoring wells, and sampling of all PA-18 monitoring wells
- Trenching
- Water-level monitoring.

These field activities will be conducted in accordance with procedures described in the HPA QAPjP (*HLA, 1988a*) and HPA Site Safety Plan (*HLA, 1988b*). Field, decontamination, and QA/QC procedures and related site activities are described below.

### **6.5.1 Geophysical Surveys**

A geophysical investigation will be conducted along proposed Trench T-1 in the central portion of Site PA-18 to evaluate the horizontal and vertical boundaries of sand fill material reported in a test pit and to assess the presence of underground utilities or other obstructions prior to trenching. All boring and well locations will also be surveyed for underground utilities. Both GPR and electromagnetic (EM) surveys will be performed. These geophysical techniques are useful noninvasive methods for characterizing the site before trenching and drilling. The procedures for these geophysical methods are described in Sections 5.2.1 and 5.2.2 of the QAPjP.

### **6.5.2 Drilling and Sampling of Soil Borings**

Borings for the collection of soil samples and installation of monitoring wells will be drilled using a hollow-stem auger drill rig in accordance with the procedures described in Sections 6.1, 6.2, and 6.3 of the QAPjP. To evaluate the depth of fill at each site, each boring will be advanced approximately 2 feet into the Bay mud deposits

underlying the bedrock-derived and/or industrial fill or until bedrock is encountered. Depth to groundwater is anticipated to be 12 to 16 feet bgs, but may not be encountered in areas where shallow bedrock is present.

Soil samples from each boring (including those drilled for the monitoring wells) will be collected at depths of 1, 2.5, 5, 10 and 15-feet bgs and submitted for analysis. Below 15 feet to the total depth of each boring, soil samples will be collected at 5-foot intervals; samples collected at 10-foot intervals will be submitted for analysis. The samples will be collected using a split-barrel sampler lined with stainless steel sample tubes as described in Section 7.2 of the QAPjP. To insure personal safety, soil samples will be screened for radiation in accordance with the revised site safety plan. Samples exhibiting radiation levels above background may be sent to selected laboratories for analyses to determine the specific radionuclides present.

Upon completion of drilling and sampling of each boring, the water level will be recorded if groundwater was encountered. The borings will then be backfilled with a mixture of neat cement and approximately 5 percent bentonite. The calculated and actual volume of grout used for backfilling borings will be recorded. Soil produced during drilling operations will be properly labeled, containerized, sampled and disposed (Section 10.2 of the QAPjP.)

### **6.5.3 Installation and Sampling of Monitoring Wells**

At selected locations, single-cased shallow aquifer groundwater monitoring wells will be installed in borings drilled using the hollow-stem auger method. The wells will be used to monitor groundwater conditions in the uppermost 15 feet of the aquifer; it is expected that all wells will be completed in fill. Monitoring well installation procedures and well construction methods are presented in Sections 6.5 and 6.5.1 of the QAPjP.

The wells will be constructed of 4-inch-diameter polyvinyl chloride (PVC) screen and casing. The screen will extend from a maximum of 5 feet above the water table to approximately 15 feet below the water table or to the bottom of the fill materials, whichever is less. The minimum depth of the surface seal will be 3 feet bgs. The calculated and actual volume of grout, bentonite, and filter pack material used for construction of the wells will be recorded on the drill logs.

Following installation, the wells will be developed as described in Section 6.6 of the QAPjP. Three sampling rounds will be conducted at each site. Water levels will be monitored in accordance with Section 9.1.1 of the QAPjP; groundwater sampling procedures will be in accordance with Section 8.1 of the QAPjP. If free product is encountered, the thickness of that layer will be measured in accordance with Section 8.2 of the QAPjP. Drill cuttings and groundwater produced during monitoring well development and sampling will be disposed as for soil boring cuttings.

#### **6.5.4 Trenching**

A trench approximately 100 feet long will be excavated to depths of between 6 and 8 feet bgs (Plate 7). A heavy equipment operator, licensed by the State of California, will operate the backhoe equipment used for trenching. All excavated soil will be placed on plastic tarps next to the trench until the trench has been logged by the field geologist. The excavated soil will be screened with field monitoring equipment for organic vapors and radiation. Soils exhibiting organic vapors or radiation above background levels will be sampled and sent to approved laboratories for analysis. The locations of all organic vapor and radiation anomalies will be noted on the trench log. Upon completion of trenching, the excavated soil will be placed in the excavation and the area will be repaved.

#### **6.5.5 Sample Numbering System**

To enable submittal of blind samples to the laboratory, each sample is assigned a unique eight-character identifier (e.g., 9135G050). The first two characters designate the year of sampling (1991), the third and fourth characters identify the week of sampling (35th week in 1991), the fifth character designates the sampler (sampling person "G") and the remaining three characters represent the sequential sample number for the sampling person (G) taken over the life of the project (e.g. 50th sample ever taken by sampling person at HPA). This is the only sample number provided to the chemical laboratory. Sample location, media, and depth are recorded in the project record for cross-reference purposes.

#### **6.5.6 Decontamination Procedures**

Decontamination of sampling and drilling equipment will be conducted by washing or steam cleaning (high pressure, hot water wash) in accordance with the procedures described in Section 10.1 of the QAPjP. Decontamination of all soil and groundwater sample collection containers (e.g., bailers) will be conducted by washing with phosphate-free detergent and rinsing with distilled, deionized (DI), or clean water, as appropriate. The decontamination water will be containerized along with the liquids produced during well development and sampling; the combined fluids will be sampled and properly disposed (Section 10.2 of the QAPjP).

#### **6.5.7 QA/QC Procedures**

Quality assurance/quality control (QA/QC) procedures followed during the RI will include calibration of field and laboratory equipment; analysis of field and laboratory QA/QC samples; and data reduction, validation, and reporting, as described in Sections 12.0, 14.0, and 15.0 of the QAPjP, respectively. Sample container, handling, and preservation requirements for soil and groundwater samples are summarized in

Table 26. The required laboratory QA/QC samples are summarized in Table 27. The sample custody procedures defined in Section 11.0 of the QAPjP will be followed.

#### **6.5.8 Site Safety Plan**

A site description and a hazard potential analysis have been prepared for Site PA-18 as addenda to the HPA Site Safety Plan (HLA, 1988b). Standard health and safety procedures are described in the Safety Plan. Preparation of another addendum to the existing site safety plan is in progress which will describe the procedures for personal protection monitoring for alpha, beta, and gamma radiation during field activities. These procedures will be implemented prior to commencing field activities.

#### **6.6 Community Relations**

The *Community Relations Plan, Remedial Investigations/Feasibility Studies, Naval Station, Treasure Island, Hunters Point Annex* (HLA, 1989b) presents the overall plan for community relations activities for environmental investigations at HPA.

Specific community relations activities for the RIs include:

- o Placement of this RI Work Plan and subsequent RI report(s) in the information repositories
- o Distribution of an information release notifying the community of upcoming RI sampling activities.

#### **6.7 Reports And Submittals**

Upon completion of the primary phase RI field investigation activities and receipt of laboratory analytical data, a data submittal will be prepared that includes tabulated soil and groundwater chemical data, boring logs, well completion diagrams, and plates and cross sections. The data submittal is a transmittal of unvalidated or partially



validated data and is intended to inform all responsible parties of the initial results. If additional RI activities are necessary, a data submittal will be prepared after each phase.

Upon evaluation of primary phase RI hydrogeologic and validated chemical data, a summary of findings memorandum (SFM) will be prepared that will include the following:

- o Summary of field data
- o Boring logs
- o Well completion details
- o Water-level contour maps
- o Tabulated analytical results
- o Interpretation and evaluation of results
- o Recommendations.

Upon completion of field activities performed for the RI, an RI report will be prepared documenting previous investigations and each RI field investigation phase. The report will include all analytical and hydrogeologic data obtained from Site PA-18.

Activities performed during the RI will be consistent with the following documents:

- o U.S. EPA, Office of Solid Waste and Emergency Response, 1985. *Guidance on Remedial Investigations Under CERCLA*. EPA/540/G-85/002, June.
- o U.S. EPA Region 9, 1987, *Preparation of a PRP Sample Plan for EPA Region 9*. 9 p. October.

## 6.8 Operational Plan

The Operational Plan presented in the sections below describes the approach for coordination with the regulatory agencies, the responsibilities of the field team members,

and the schedule for field sampling activities. The purpose of the Operational Plan is to specify the sequence of the field activities to allow for a cost-effective sampling effort.

The specific field schedule will be developed in conjunction with the agencies as the review process proceeds. The RI will also be coordinated with other RI activities to the extent possible.

#### **6.8.1 Agency Coordination**

Site inspection activities by PRC and the Navy will be coordinated with appropriate federal, state, and local agencies. Because all field investigation activities outlined in this RI work plan will be performed under the direction and supervision of PRC in conjunction with the Navy, project planning and adjustments to the field activities can be coordinated by PRC and the Navy with the regulatory agencies in a streamlined manner. Changes in the field operations or schedule will be documented and communicated to PRC and the Navy's Engineer-in-Charge (EIC), who will notify the regulatory agency designees.

#### **6.8.2 Field Investigation Organization**

Field sampling activities will be performed under the supervision of the RI Field Investigation Manager. Each field team generally consists of two geophysical team members to locate underground utilities and clear boring, monitoring well, and trench locations; a geologist or engineer and a geologic/engineering technician as an assistant for drilling and monitoring well installation; and two field technicians trained in the protocol for monitoring well development, water-level monitoring, and groundwater sampling. The location of each well or boring and the top of casing elevation at each well will be surveyed by a licensed surveyor. The field geologist or technicians will be

responsible for sample collection and handling; the sampling is performed under the supervision of the RI Field Investigation Manager who reviews daily notes and logs. Field activities will be conducted under the supervision of a California-registered geologist.

#### **6.8.3 Coordination with RI Activities**

To the extent possible, field work will be coordinated with other ongoing RIs in order to minimize mobilization/demobilization costs and provide for efficient completion of the work.

#### **6.8.4 Schedule**

RI field activities can begin within 6 weeks of contract award for implementation of the RI work plan. Field activities, including mobilization, are anticipated to require four weeks. The general sequence of field activities for each site will be as follows:

- 1) Locate planned borings, wells, and trench
- 2) Clear boring, well, and trench locations
- 3) Drill and sample borings
- 4) Drill and install wells
- 5) Excavate trench
- 6) Develop and sample wells and measure water levels
- 7) Survey wells, borings, and trench.

The drilling of soil borings, installation of monitoring wells, and trenching activities may overlap. Well development and groundwater sampling will follow these activities. It is assumed that laboratory data will be received within five weeks of

completion of field work. A data submittal will be prepared within six weeks of receipt of analytical data. Data analysis and validation should be completed within approximately one month after all the data are received. A SFM will be submitted within two months following complete validation of all analytical data. The draft RI report is expected to take approximately 3 months to prepare following submission of the SFM. If additional RI phases are necessary, the RI report will be prepared after the last SFM has been submitted.

## 7.0 REFERENCES

- EMCON Associates, 1987. *Verification of Hazardous Waste Contamination at Specified Sites, Hunters Point Naval Shipyard, San Francisco, California*, September 27.
- ERM-WEST, 1988. *Fence-to-Fence Hazardous Materials Survey, Naval Station, Treasure Island, Hunters Point Annex, San Francisco, California*. 2 volumes. July.
- HLA, 1988a. *Work Plan Volume 3, Quality Assurance Project Plan, Remedial Investigation/Feasibility Study, Naval Station, Treasure Island, Hunters Point Annex, San Francisco, California*, May.
- HLA, 1988b. *Work Plan Volume 5, Site Safety Plan, Naval Station, Treasure Island, Hunters Point Annex, San Francisco, California*. April 14.
- HLA, 1989a. *Preliminary Assessment, Sites PA-12 through PA-18, Naval Station, Treasure Island, Hunters Point Annex, San Francisco, California*, April.
- HLA, 1989b. *Community Relations Plan, Remedial Investigations/Feasibility Studies, Naval Station, Treasure Island, Hunters Point Annex, San Francisco, California*. January.
- HLA, 1990a. *Site Inspection Work Plan, Sites PA-16 and PA-18, Naval Station, Treasure Island, Hunters Point Annex, San Francisco, California*, March.
- HLA, 1990b. *Reconnaissance Activities Report, Remedial Investigation/Feasibility Studies, Naval Station, Treasure Island, Hunters Point Annex, San Francisco, California*. Draft. August 9.
- HLA, 1990c. *Background Sampling Plan, Naval Station Treasure Island, Hunters Point Annex, San Francisco, California*. Draft. October 15.
- Marshack, J. B., 1990. *A Compilation of Water Quality Goals, California Regional Water Quality Control Board, Central Valley Region*. October.
- San Francisco District Attorney's Office (SFDA), 1986. *People of the State of California v. Triple A Machine Shop, Inc., et al. (1986), Exhibits of Peoples Memorandum of Points and Authorities in Support of Temporary Restraining Order, Constructive Trust, And Appointment of Receiver filed by Arlo Smith, District Attorney, et al. in the Superior Court of the State of California in and for the City and County of San Francisco*.
- State of California Leaking Underground Fuel Tank Task Force. *Leaking Underground Fuel Tank Manual: Guidelines for Site Assessment, Cleanup and Underground Storage Tank Closure*. May 1988.
- U.S. Environmental Protection Agency (EPA), 1986. *Test Methods for Evaluating Solid Waste, SW-846, 3rd Edition*. November.

U.S. Environmental Protection Agency, 1988a. *Contract Laboratory Program Statement of Work (SOW) for Organics Analysis*. February.

U.S. Environmental Protection Agency, 1988b. *Contract Laboratory Program Statement of Work (SOW) for Inorganics Analysis*. July.

U.S. Environmental Protection Agency, 1988c. *Laboratory Data Validation Functional Guidelines for Evaluating Organics Analyses*. Draft. February 1.

U.S. Environmental Protection Agency, 1988d. *Laboratory Data Validation Functional Guidelines for Evaluating Inorganic Analyses*. Draft. July 1.

U.S. Environmental Protection Agency, 1990. *Corrective Action for Solid Waste Management Units (SWMUs) at Hazardous Waste Management Facilities*. Fed. Reg. 55, 30798-30884. July 27.

T

TABLES

F

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R

D

**Table 1. Reported Evidence of Potential Contamination at Site PA-16**

Evidence of Contamination	Reference	Recommendation
Barrel containing oily rags likely soaked with PCB-containing oil, stored on site.	Exhibit B <sup>1</sup> P.11 of 33	
Drums previously stored onsite.	Exhibit B <sup>1</sup> P.12 of 33	
Old barrels and cans stored onsite.	Exhibit B-1 <sup>1</sup> P.1 of 2	
One hundred drums labeled as "PCB-containing" oil previously stored onsite.	Exhibit E <sup>1</sup> P.10 of 10	
Four drums, transformers, one 5,000-gallon tank, and some unidentified "flammable solids" were stored onsite.	P000250 <sup>2</sup> P.1-5 of 5	Investigate possible contamination of soils and groundwater in and adjacent to PA-16.

NO CHEMICAL DATA PRESENTLY AVAILABLE

Notes:

1 SFDA, 1986.

2 ERM-WEST, 1988.



**Table 2. Boring and Monitoring Well Drilling and Sampling Information, Site PA-16**

Well and Boring Numbers	Date Drilled	Total Depth (feet)	Soil Sampling Depth Intervals (feet bgs)	Laboratory Soil Sample Number
<b><u>Wells</u></b>				
PA16MW16A	5-Feb-91	20.0	2.25 - 3.00 4.75 - 5.50	9106G601 9106G602
PA16MW17A	5-Feb-91	16.5	(no samples+)	
PA16MW18A	6-Feb-91	20.5	8.75 - 9.50	9106H592
<b><u>Borings</u></b>				
PA16B001	7-Feb-91	8.0	1.25 - 2.00 4.25 - 5.00	9106G605 9106G606
PA16B002	4-Feb-91	12.0	3.75 - 4.50 8.25 - 9.00	9106H589 9106H590
PA16B003	4-Feb-91	31.0	5.75 - 6.50 10.25 - 11.00	9106H587 9106H588
PA16B004	6-Feb-91	19.5	1.75 - 2.50 5.75 - 6.50	9106H595 9106H596
PA16B005	1-Feb-91	17.0	1.25 - 2.00 4.25 - 5.00	9105G599 9105G600
PA16B006	6-Feb-91	12.5	1.25 - 2.00 5.75 - 6.50	9106H593 9106H594
PA16B017B	5-Feb-91	6.5	1.00 - 1.75 5.25 - 6.00	9106G603 9106G604
PA16B018A	6-Feb-91	6.5	1.25 - 2.00	9106H591

**Notes:**

bgs = Below ground surface  
 + = Soil samples from Boring PA16B017B, located adjacent to PA16MW17A, were analyzed

**Table 3. Well Construction Details  
Site PA-16**

Well Number	Total Depth (feet)	Top of Casing Elevation (feet AMSL <sup>1</sup> )	Screened Interval (feet BTOC <sup>2</sup> )	Sand Pack (feet BTOC)	Seal (feet BTOC)	Lithologic Unit Screened
PA16MW16A	20.0	8.88	5 - 20	4 - 20	2.75 - 4.0	Qaf <sup>3</sup>
PA16MW17A	16.5	8.68	4 - 16.5	3 - 16.5	2 - 3	Qaf/Qaif <sup>4</sup>
PA16MW18A	20.5	8.79	5.3 - 20.3	4 - 20.3	3 - 4	Qaf

**Notes:**

- 1 AMSL = Above mean sea level adjusted to MSL from previously surveyed datum
- 2 BTOC = Below top of casing
- 3 Qaf = Bedrock-Derived Fill
- 4 Qaif = Industrial Fill

**Table 4. Field Parameters and Water-Level Measurements from Well Monitoring  
Site PA-16**

Well Number	Top of Casing Elevation (Feet AMSL)	Date Sampled	Time Sampled	Depth to Water (Feet BTOC)	Calculated Water- Level Elevation (Feet AMSL)	pH (Units)	Electrical Conductivity (micromhos per centimeter)*	Tempera- ture °C	Turbidity (NTU)	Gallons Removed	Casing Volumes Removed	Field Observa- tions
PA16MW16A	8.58	12-Feb-91 1-Apr-91(1)	08:30 11:45	8.11 7.35	0.47 1.23	7.0	15000	16.7	>100	22.0	3.0	
PA16MW17A	8.51	12-Feb-91 1-Apr-91(1)	12:00 11:36	7.70 7.26	0.81 1.25	7.4	2950	18.9	>100	17.0	3.0	Grayish color, no odor
PA16MW18A	8.36	14-Feb-91 1-Apr-91(1)	10:40 11:36	7.67 7.15	0.69 1.21	7.4	4200	17.2	>100	24.0	3.0	Odorless, clear to silty gray

**Notes:**

AMSL = Above mean sea level adjusted to MSL from previously surveyed datum  
 BTOC = Below top of casing  
 bgs = Below ground surface  
 \* = Electrical conductivity at measured temperature  
 NTU = Nephelometric turbidity units  
 1 = Only water-level elevation measured on this date

**Table 5. Analytical Methods (Soil)**

Parameter	Analytical Method	Reference
Volatile Organic Compounds (VOCs)	CLP VOC	SOW 2/88 <sup>1</sup>
Semivolatile Organic Compounds (SOCs)	CLP SOC	SOW 2/88 <sup>1</sup>
Total Petroleum Hydrocarbons as Diesel	EXTN/GC-FID	LUFT <sup>4</sup>
Total Petroleum Hydrocarbons as Gasoline	EPA 5030/GC-FID	SW-846 <sup>3</sup> /LUFT <sup>4</sup>
Oil and Grease	EPA 9071	SW-846 <sup>3</sup>
Polychlorinated Biphenyls and Pesticides	CLP Pesticides/PCBs	SOW 2/88 <sup>1</sup>
CLP Metals (including Molybdenum)	CLP Metals	SOW 7/88 <sup>2</sup>
Hexavalent Chromium	EPA 7196	SW-846 <sup>3</sup>
Cyanide	CLP Cyanide	SOW 7/88 <sup>2</sup>
pH	EPA 9045	SW-846 <sup>3</sup>

Notes:

- 1 U.S. EPA, 1988a. *Contract Laboratory Program, Statement of Work (SOW) for Organics Analysis*. February.
- 2 U.S. EPA, 1988b. *Contract Laboratory Program, Statement of Work (SOW) for Inorganics Analysis*. July.
- 3 U.S. EPA, 1986. *Test Methods for Evaluating Solid Waste, SW-846, 3rd Edition*. November.
- 4 State of California Leaking Underground Fuel Tank Task Force, 1988. *Leaking Underground Fuel Tank Manual: Guidelines for Site Assessment, Cleanup and Underground Storage Tank Closure*. May.

**Table 6. Analytical Methods (Groundwater)**

Parameter	Analytical Method	Reference
Volatile Organic Compounds (VOCs)	CLP VOC	SOW 2/88 <sup>1</sup>
Semivolatile Organic Compounds (SOCs)	CLP SOC	SOW 2/88 <sup>1</sup>
Total Petroleum Hydrocarbons as Diesel	EXTN/GC-FID	LUFT <sup>4</sup>
Total Petroleum Hydrocarbons as Gasoline	EPA 5030/GC-FID	SW-846 <sup>3</sup> /LUFT <sup>4</sup>
Oil and Grease	EPA 9070	SW-846 <sup>3</sup>
Polychlorinated Biphenyls and Pesticides	CLP Pesticides/PCBs	SOW 2/88 <sup>1</sup>
Metals (including Molybdenum)	CLP Metals	SOW 7/88 <sup>2</sup>
Hexavalent Chromium	EPA 7196	SW-846 <sup>3</sup>
Cyanide	CLP Cyanide	SOW 7/88 <sup>2</sup>
pH		

Notes:

- 1 U.S. EPA, 1988. *Contract Laboratory Program, Statement of Work (SOW) for Organics Analysis*. February.
- 2 U.S. EPA, 1988. *Contract Laboratory Program, Statement of Work (SOW) for Inorganics Analysis*. July.
- 3 U.S. EPA, 1986. *Test Methods for Evaluating Solid Waste, SW-846, 3rd Edition*. November.
- 4 State of California Leaking Underground Fuel Tank Task Force, 1988. *Leaking Underground Fuel Tank Manual: Guidelines for Site Assessment, Cleanup and Underground Storage Tank Closure*. May.

Table 7  
Analytical Results for Organic Compounds Detected in Soil Samples  
Site PA-16  
Hunters Point Annex

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Station Number:	PA16B001	PA16B001	PA16B002	PA16B002
Sample Depth (feet):	1.25	4.25	3.75	8.25
Sample Number:	9106G605	9106G606	9106H589	9106H590
Matrix:	SOIL	SOIL	SOIL	SOIL
Sample Date:	02/07/91	02/07/91	02/04/91	02/04/91
Lab Sample Number:	75468	75469	74228	74229

Test Method/Analyte Name	Units	value	qual	value	qual	value	qual	value	qual
CLP-VOC									
Toluene	ug/kg	ND (5.1)	A	ND (5.2)	A	160	F	130	F
CLP-SOC									
Phenanthrene	ug/kg	ND (340)	A	ND (340)	A	ND (370)	A	ND (380)	A
Fluoranthene	ug/kg	ND (340)	A	ND (340)	A	ND (370)	A	ND (380)	A
Pyrene	ug/kg	ND (340)	A	ND (340)	A	ND (370)	A	ND (380)	A
TPH DIESEL									
TPH-Diesel	mg/kg	ND (10)	A	ND (10)	A	39	A	ND (12)	A
OIL & GREASE									
Total Oil & Grease	mg/kg	ND (51)	A	26.7	J	56.2	A	30.1	J

Notes: Units expressed as micrograms (ug) or milligrams (mg) of chemical per kilogram (kg) of soil.  
NA: Not Analyzed.  
ND(): Not Detected at a specific reporting limit. Reporting limit is included in parenthesis.

Table 7  
Analytical Results for Organic Compounds Detected in Soil Samples  
Site PA-16  
Hunters Point Annex

Page 2

Station Number:	PA16B003	PA16B003	PA16B004	PA16B004
Sample Depth(feet):	5.75	10.25	1.75	5.75
Sample Number:	9106H587	9106H588	9106H595	9106H596
Matrix:	SOIL	SOIL	SOIL	SOIL
Sample Date:	02/04/91	02/04/91	02/06/91	02/06/91
Lab Sample Number:	74226	74227	75107	75108

Test Method/Analyte Name	Units	value	qual	value	qual	value	qual	value	qual
CLP-VOC									
Toluene	ug/kg	41	F	44	F	8.3	FJ3	50	FJ35
CLP-SOC									
Phenanthrene	ug/kg	ND(380)	A	270	J	290	J	ND(350)	A
Fluoranthene	ug/kg	ND(380)	A	ND(380)	A	460	A	ND(350)	A
Pyrene	ug/kg	ND(380)	A	ND(380)	A	440	A	ND(350)	A
TPH DIESEL									
TPH-Diesel	mg/kg	68	A	230	A	ND(13)	A	ND(11)	A
OIL & GREASE									
Total Oil & Grease	mg/kg	ND(58)	A	ND(58)	A	66.3	J	41	J

Notes: Units expressed as micrograms (ug) or milligrams (mg) of chemical per kilogram (kg) of soil.  
NA: Not Analyzed.  
ND(): Not Detected at a specific reporting limit. Reporting limit is included in parenthesis.

Table 7  
Analytical Results for Organic Compounds Detected in Soil Samples  
Site PA-16  
Hunters Point Annex

Station Number:	PA16B005	PA16B005	PA16B006	PA16B006
Sample Depth(feet):	1.25	4.25	1.25	5.75
Sample Number:	9105G599	9105G600	9106H593	9106H594
Matrix:	SOIL	SOIL	SOIL	SOIL
Sample Date:	02/01/91	02/01/91	02/06/91	02/06/91
Lab Sample Number:	73994	73995	75105	75106

Test Method/Analyte Name	Units	value	qual	value	qual	value	qual	value	qual
CLP-VOC									
Toluene	ug/kg	37	F	100	F	3.3	FJ35/J	31	FJ35
CLP-SOC									
Phenanthrene	ug/kg	ND(350)	A	ND(360)	A	ND(720)	A	ND(380)	A
Fluoranthene	ug/kg	ND(350)	A	ND(360)	A	ND(720)	A	ND(380)	A
Pyrene	ug/kg	ND(350)	A	ND(360)	A	ND(720)	A	ND(380)	A
TPH DIESEL									
TPH-Diesel	mg/kg	100	A	25	A	150	A	35	A
OIL & GREASE									
Total Oil & Grease	mg/kg	136	A	46	J	246	A	73.2	A

Notes: Units expressed as micrograms (ug) or milligrams (mg) of chemical per kilogram (kg) of soil.  
NA: Not Analyzed.  
ND(): Not Detected at a specific reporting limit. Reporting limit is included in parenthesis.



Table 7  
Analytical Results for Organic Compounds Detected in Soil Samples  
Site PA-16  
Hunters Point Annex

Page 4

Station Number:	PA16B017B	PA16B017B	PA16B018A	PA16MW16A
Sample Depth(feet):	1.00	5.25	1.25	2.25
Sample Number:	9106G603	9106G604	9106H591	9106G601
Matrix:	SOIL	SOIL	SOIL	SOIL
Sample Date:	02/05/91	02/05/91	02/06/91	02/05/91
Lab Sample Number:	74663	74664	74661	74224

Test Method/Analyte Name	Units	value	qual	value	qual	value	qual	value	qual
CLP-VOC									
Toluene	ug/kg	130	F	21	F	85	F	200	F
CLP-SOC									
Phenanthrene	ug/kg	ND(450)	A	ND(380)	A	ND(360)	J5	ND(370)	VA
Fluoranthene	ug/kg	ND(450)	A	ND(380)	A	ND(360)	J5	ND(370)	VA
Pyrene	ug/kg	ND(450)	A	ND(380)	A	ND(360)	J5	ND(370)	VA
TPH DIESEL									
TPH-Diesel	mg/kg	ND(13)	A	42	A	310	D	70	VA
OIL & GREASE									
Total Oil & Grease	mg/kg	208	A	54.7	J	261	A	63.4	A

Notes: Units expressed as micrograms (ug) or milligrams (mg) of chemical per kilogram (kg) of soil.  
NA: Not Analyzed.  
ND(): Not Detected at a specific reporting limit. Reporting limit is included in parenthesis.

Table 7  
Analytical Results for Organic Compounds Detected in Soil Samples  
Site PA-16  
Hunters Point Annex

Station Number:	PA16MW16A	PA16MW18A
Sample Depth(feet):	4.75	8.75
Sample Number:	9106G602	9106H592
Matrix:	SOIL	SOIL
Sample Date:	02/05/91	02/06/91
Lab Sample Number:	74225	74662

Test Method/Analyte Name	Units	value	qual	value	qual
CLP-VOC					
Toluene	ug/kg	39	A	14	J35
CLP-SOC					
Phenanthrene	ug/kg	ND(370)	A	ND(370)	VA
Fluoranthene	ug/kg	ND(370)	A	ND(370)	VA
Pyrene	ug/kg	ND(370)	A	ND(370)	VA
TPH DIESEL					
TPH-Diesel	mg/kg	41	A	ND(11)	VA
OIL & GREASE					
Total Oil & Grease	mg/kg	29.1	J	37.8	J

Notes: Units expressed as micrograms (ug) or milligrams (mg) of chemical per kilogram (kg) of soil.  
NA: Not Analyzed.  
ND(): Not Detected at a specific reporting limit. Reporting limit is included in parenthesis.

Validation Assigned Qualifiers

- A: Data is acceptable based on a review of laboratory and field QC samples and holding times as discussed in the text.
- F: The presence of this compound is due to suspected field contamination.
- J3: Analytical results for this compound are qualified as estimated due to poor spike recoveries.
- J5: Analytical results for this compound are qualified as estimated due to holding time exceedances.
- J7: Analytical results for this compound are qualified as estimated due to linearity problems in the initial calibration.
- J8: Analytical results for this compound are qualified as estimated due to detection of the compound above the instrument calibration range.
- R1: Analytical results for this compound are qualified as rejected due to holding time exceedances.
- R2: Analytical results for this compound are qualified as rejected due to poor spike recoveries.
- U1: Compound is qualified as non-detected due to its occurrence in the laboratory blanks.
- U2: Compound is qualified as non-detected due to its occurrence in the field blanks.
- V: Sample has undergone full CLP validation.

Laboratory Assigned Qualifiers

- B: Compound is also detected in the laboratory method blank.
- #,b: Analytical results should not be considered reliable for this common lab contaminant.
- D: Compound is identified in an analysis at a secondary dilution factor.
- E: Concentration exceeds the calibration range of the GC/MS instrument for the specific analysis.
- G: Reporting limit raised due to matrix interference.
- J: Result is detected below the reporting limit or is an estimated concentration.
- j: All reporting limits for this sample raised due to matrix interferences.
- l: If 'l' is attached to a diesel result, then either the hydrocarbons present in this sample represent an unknown mixture at a concentration of less than 45 mg/kg, or the hydrocarbons present in this sample do not fit the diesel pattern, but are found in the diesel range. (Quantification was based upon diesel references.) If 'l' is attached to a gasoline result, then this sample contains late eluting hydrocarbons. Early gasoline peaks are below reporting limits.
- o: Reporting limit raised due to high level of analyte present in sample.

Laboratory Assigned Qualifiers (Continued...)

r: Reporting limit changed due to sample volume limitations.

U: Compound was analyzed but not detected.

X,Y: Specific flag used to properly define the results. Qualifier is fully described in the Sample Data Summary Package and the Case Narrative.

R

A

F

T

Table 8  
Analytical Results for Inorganic Compounds Detected in Soil Samples  
Site PA-16  
Hunters Point Annex

Page 1

Station Number:	PA16B001	PA16B001	PA16B002	PA16B002
Sample Depth(feet):	1.25	4.25	3.75	8.25
Sample Number:	9106G605	9106G606	9106H589	9106H590
Matrix:	SOIL	SOIL	SOIL	SOIL
Sample Date:	02/07/91	02/07/91	02/04/91	02/04/91
Lab Sample Number:	75468	75469	74228	74229

Test Method/Analyte Name	Units	value	qual	value	qual	value	qual	value	qual
CLP-CVAA									
Mercury	mg/kg	ND(0.051)	A	ND(0.052)	A	ND(0.056)	J5	0.07	J5
CLP-FUAA									
Arsenic	mg/kg	3.9	A	4	A	5.7	A	4.3	S
Lead	mg/kg	2.5	W	2.8	A	7.5	*	8	*
Selenium	mg/kg	ND(1)	W	ND(1)	A	ND(1.1)	NW	ND(1.2)	NW
CLP-ICP									
Aluminum	mg/kg	4380	A	4020	A	34600	A	35700	A
Antimony	mg/kg	21.5	J3/N	17.7	J3/N	92.1	J3/N	83.9	J3/N
Barium	mg/kg	33.1	B	14	B	251	A	170	A
Beryllium	mg/kg	0.22	B	0.13	B	0.89	B	0.73	B
Cadmium	mg/kg	2.2	A	0.78	B	10.5	A	9.4	A
Calcium	mg/kg	5280	J3	8450	J3	15000	J3	25700	J3
Chromium	mg/kg	24.8	A	22.1	A	250	A	395	A
Cobalt	mg/kg	7.5	B	7.1	B	39.5	A	48.2	A
Copper	mg/kg	4.5	B	17.2	A	81.1	A	78	A
Iron	mg/kg	12200	A	10600	A	49200	A	45400	A
Magnesium	mg/kg	3060	A	3560	A	68000	A	75400	A
Manganese	mg/kg	276	A	223	A	1460	A	799	A
Nickel	mg/kg	32.9	A	28.9	A	438	A	696	A
Potassium	mg/kg	868	B	758	B	914	B	840	B
Silver	mg/kg	ND(1)	A	ND(1)	A	ND(1.1)	A	ND(1.2)	A
Sodium	mg/kg	293	B	1000	B	938	B	1140	B
Vanadium	mg/kg	19.1	A	17.6	A	88.4	A	67.8	A
Zinc	mg/kg	19.9	A	18	A	86	E	72.3	E
Molybdenum	mg/kg	1.3	B	ND(1)	A	ND(4)	U1	ND(3.7)	U1
EPA-9045									
pH	ph	7.7	J5	9.1	J5	8.9	A	8.6	A

Notes: Units expressed as milligrams (mg) of chemical per kilogram (kg) of soil.

NA: Not Analyzed.

ND(): Not Detected at a specific detection limit. Limit of detection is included in parenthesis.

Table 8  
Analytical Results for Inorganic Compounds Detected in Soil Samples  
Site PA-16  
Hunters Point Annex

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Station Number:	PA16B003	PA16B003	PA16B004	PA16B004
Sample Depth(feet):	5.75	10.25	1.75	5.75
Sample Number:	9106H587	9106H588	9106H595	9106H596
Matrix:	SOIL	SOIL	SOIL	SOIL
Sample Date:	02/04/91	02/04/91	02/06/91	02/06/91
Lab Sample Number:	74226	74227	75107	75108

Test Method/Analyte Name	Units	value	qual	value	qual	value	qual	value	qual
CLP-CVAA									
Mercury	mg/kg	0.08	J5	0.09	J5	ND(0.067)	J5	0.1	J5
CLP-FUAA									
Arsenic	mg/kg	5.5	A	4.5	A	8.3	A	5	A
Lead	mg/kg	7.5	A	6.9	A	8	*	6.5	*
Selenium	mg/kg	ND(1.2)	NW	ND(1.2)	NW	ND(1.3)	NW	ND(1.1)	NE
CLP-ICP									
Aluminum	mg/kg	32600	A	35500	A	15600	A	35700	A
Antimony	mg/kg	74.6	J3/N	81.3	J3/N	75.9	J3/N	76.2	J3/N
Barium	mg/kg	281	A	127	A	41.2	B	165	A
Beryllium	mg/kg	0.82	B	0.79	B	0.46	B	0.78	B
Cadmium	mg/kg	8.8	A	9.5	A	5.8	A	8.6	A
Calcium	mg/kg	16400	J3	12200	J3	4780	J3	11600	J3
Chromium	mg/kg	258	A	310	A	60.1	A	381	A
Cobalt	mg/kg	33.6	A	38.1	A	11	B	39.5	A
Copper	mg/kg	42.3	A	51.6	A	32.2	J2	43.1	J2
Iron	mg/kg	42400	A	43100	A	32500	A	42600	A
Magnesium	mg/kg	60400	A	78300	A	7930	A	76900	A
Manganese	mg/kg	762	A	756	A	205	A	825	A
Nickel	mg/kg	465	A	626	A	67.2	A	584	A
Potassium	mg/kg	1160	A	680	B	2760	B	1000	B
Silver	mg/kg	ND(1.2)	A	ND(1.2)	A	1.5	B	1.8	B
Sodium	mg/kg	456	B	1020	B	351	B	715	B
Vanadium	mg/kg	67.1	A	64	A	56.5	A	66.3	A
Zinc	mg/kg	68.5	E	68.7	E	51.8	E	71.7	E
Molybdenum	mg/kg	ND(2.9)	U1	ND(4)	A	8.2	A	ND(6.1)	U1
EPA-9045									
pH	ph	7.9	A	8.6	A	7.7	A	9	A

Notes:

Units expressed as milligrams (mg) of chemical per kilogram (kg) of soil.

NA: Not Analyzed.

ND(): Not Detected at a specific detection limit. Limit of detection is included in parenthesis.

Table 8  
Analytical Results for Inorganic Compounds Detected in Soil Samples  
Site PA-16  
Hunters Point Annex

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Station Number:	PA16B005	PA16B005	PA16B006	PA16B006
Sample Depth(feet):	1.25	4.25	1.25	5.75
Sample Number:	9105G599	9105G600	9106H593	9106H594
Matrix:	SOIL	SOIL	SOIL	SOIL
Sample Date:	02/01/91	02/01/91	02/06/91	02/06/91
Lab Sample Number:	73994	73995	75105	75106

Test Method/Analyte Name	Units	value	qual	value	qual	value	qual	value	qual
CLP-CVAA									
Mercury	mg/kg	0.22	J5	0.18	J5	0.13	J5	0.14	J5
CLP-FUAA									
Arsenic	mg/kg	3.4	A	5	A	3.7	A	15.7	S
Lead	mg/kg	6	*	6.5	*	14.4	*	40.4	A
Selenium	mg/kg	0.91	BN	ND(1.1)	NW	ND(1.1)	A	ND(1.1)	E
CLP-ICP									
Aluminum	mg/kg	26500	A	36500	A	22900	A	39100	A
Antimony	mg/kg	71.2	J3/N	72.2	J3/N	70.8	J3/N	80.1	J3
Barium	mg/kg	302	A	142	A	259	A	191	A
Beryllium	mg/kg	0.86	B	0.89	B	0.87	B	0.78	B
Cadmium	mg/kg	11.1	A	14	A	5.9	A	8	A
Calcium	mg/kg	28800	J3	12500	J3	14100	J3	13500	J3
Chromium	mg/kg	87.4	A	503	A	45.3	A	335	A
Cobalt	mg/kg	25.7	A	42.7	A	22.1	A	49.1	A
Copper	mg/kg	32.6	J2	48	J2	21.8	J2	38.1	J2
Iron	mg/kg	37900	A	44100	A	3700	A	47400	A
Magnesium	mg/kg	17800	A	73700	A	13200	A	91100	A
Manganese	mg/kg	857	A	758	A	1050	A	860	A
Nickel	mg/kg	105	A	674	A	82.3	A	657	A
Potassium	mg/kg	1090	A	679	B	1940	A	1030	B
Silver	mg/kg	ND(1)	A	ND(1.1)	A	ND(1.1)	A	ND(1.1)	A
Sodium	mg/kg	572	B	1050	B	272	B	473	B
Vanadium	mg/kg	87.2	A	67.2	A	72.7	A	75	A
Zinc	mg/kg	70	E	70.5	E	72.8	E	74.7	A
Molybdenum	mg/kg	ND(4.4)	U1	ND(1.3)	U1/B	ND(3.5)	U1	ND(5.6)	U1
EPA-9045									
pH	ph	7.7	J5	8.6	J5	8.4	A	8.6	A

Notes: Units expressed as milligrams (mg) of chemical per kilogram (kg) of soil.

NA: Not Analyzed.

ND(): Not Detected at a specific detection limit. Limit of detection is included in parenthesis.

Table 8  
Analytical Results for Inorganic Compounds Detected in Soil Samples  
Site PA-16  
Hunters Point Annex

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Station Number:	PA16B017B	PA16B017B	PA16B018A	PA16MW16A
Sample Depth(feet):	1.00	5.25	1.25	2.25
Sample Number:	9106G603	9106G604	9106H591	9106G601
Matrix:	SOIL	SOIL	SOIL	SOIL
Sample Date:	02/05/91	02/05/91	02/06/91	02/05/91
Lab Sample Number:	74663	74664	74661	74224

Test Method/Analyte Name	Units	value	qual	value	qual	value	qual	value	qual
CLP-CVAA									
Mercury	mg/kg	ND (0.067)	J5	ND (0.058)	J5	0.08	A	ND (0.056)	VJ5
CLP-FUAA									
Arsenic	mg/kg	8.3	A	3.2	A	3.6	A	5.1	VA
Lead	mg/kg	10.4	*	1.8	*W	5.9	*	10.8	V/*
Selenium	mg/kg	ND (1.3)	NW	ND (1.2)	J3/NW	ND (1.1)	NW	ND (1.1)	V/NW
CLP-ICP									
Aluminum	mg/kg	12800	A	2500	A	23500	A	23800	VA
Antimony	mg/kg	49.4	J3/N	8.6	J3/B N	85.5	J3/N	56.5	VJ3/N
Barium	mg/kg	55.6	A	11.7	B	443	A	247	VA
Beryllium	mg/kg	0.46	B	ND (125)	A	0.96	B	0.54	V/B
Cadmium	mg/kg	4.5	A	ND (0.69)	A	7.8	A	6.4	VA
Calcium	mg/kg	22800	J3	77000	J3	16300	J3	12800	VJ34
Chromium	mg/kg	48.9	A	35.7	A	107	A	243	VA
Cobalt	mg/kg	12.5	A	ND (6.7)	U1/B	32.7	A	32.3	VA
Copper	mg/kg	44.9	A	6.4	A	79.3	A	45.3	VA
Iron	mg/kg	26600	A	5790	A	45500	A	32100	VA
Magnesium	mg/kg	9310	A	2230	A	18300	A	53900	VA
Manganese	mg/kg	459	A	168	A	3140	A	602	VJ4
Nickel	mg/kg	67.2	A	32.4	A	143	A	460	VA
Potassium	mg/kg	2370	A	371	B	975	B	644	V/B
Silver	mg/kg	ND (1.3)	A	ND (1.2)	A	ND (1.1)	A	ND (1.1)	VA
Sodium	mg/kg	3280	A	978	B	854	B	1140	VA
Vanadium	mg/kg	47.7	A	12.9	A	88.1	A	44.5	VA
Zinc	mg/kg	73.9	E	11	E	116	E	51	VJ4/E
Molybdenum	mg/kg	ND (5.6)	U1	ND (1.2)	A	ND (4.4)	U1	ND (3.6)	VU1
EPA-9045									
pH	ph	7.7	A	8	A	7.7	A	8.3	A

Notes: Units expressed as milligrams (mg) of chemical per kilogram (kg) of soil.

NA: Not Analyzed.

ND(): Not Detected at a specific detection limit. Limit of detection is included in parenthesis.



Table 8  
Analytical Results for Inorganic Compounds Detected in Soil Samples  
Site PA-16  
Hunters Point Annex

Station Number:	PA16MW16A	PA16MW18A
Sample Depth (feet):	4.75	8.75
Sample Number:	9106G602	9106H592
Matrix:	SOIL	SOIL
Sample Date:	02/05/91	02/06/91
Lab Sample Number:	74225	74662

Test Method/Analyte Name	Units	value	qual	value	qual
CLP-CVAA					
Mercury	mg/kg	ND (0.056)	J5	ND (0.057)	VA
CLP-FUAA					
Arsenic	mg/kg	5.2	+	3.4	V/S
Lead	mg/kg	6.3	A	6.9	VA
Selenium	mg/kg	ND (1.1)	NW	ND (1.1)	V/NW
CLP-ICP					
Aluminum	mg/kg	37300	A	35800	VA
Antimony	mg/kg	83.2	J3/N	79.9	VJ3/N
Barium	mg/kg	118	A	249	VA
Beryllium	mg/kg	0.84	B	0.78	V/B
Cadmium	mg/kg	10	A	9.9	VA
Calcium	mg/kg	14800	J3	14900	VJ34
Chromium	mg/kg	332	A	410	VA
Cobalt	mg/kg	37.7	A	48.6	VA
Copper	mg/kg	38.9	A	53	VA
Iron	mg/kg	44100	A	43600	VA
Magnesium	mg/kg	75000	A	75500	VA
Manganese	mg/kg	794	A	786	VJ4
Nickel	mg/kg	590	A	750	VA
Potassium	mg/kg	663	B	821	V/B
Silver	mg/kg	ND (1.1)	A	ND (1.1)	VA
Sodium	mg/kg	548	B	1210	VA
Vanadium	mg/kg	69.1	A	68.3	VA
Zinc	mg/kg	67.7	E	69.3	VJ4/E
Molybdenum	mg/kg	ND (4.4)	U1	ND (3.6)	VU1
EPA-9045					
pH	ph	8.6	A	9.1	A

Notes: Units expressed as milligrams (mg) of chemical per kilogram (kg) of soil.

NA: Not Analyzed.

ND(): Not Detected at a specific detection limit. Limit of detection is included in parenthesis.

Validation Assigned Qualifiers

- A: Data is acceptable based on a review of laboratory and field QC samples and holding times as discussed in the text.
- J2: Analytical results for this compound are qualified as estimated due to laboratory matrix duplicate quality control criteria exceedances.
- J3: Analytical results for this compound are qualified as estimated due to poor spike recoveries.
- J4: Analytical results for this compound are qualified as estimated due to ICP-serial dilution relative percent difference quality control criteria exceedances.
- J5: Analytical results for this compound are qualified as estimated due to holding time exceedances.
- J6: Analytical results for this compound are qualified as estimated due to field duplicate quality control criteria exceedances.
- R1: Analytical results for this compound are qualified as rejected due to holding time exceedances.
- R2: Analytical results for this compound are qualified as rejected due to poor spike recoveries.
- U1: Compound is qualified as non-detected due to its occurrence in the laboratory blanks.
- U2: Compound is qualified as non-detected due to its occurrence in the field blanks.
- V: Sample has undergone full CLP validation.

Laboratory Assigned Qualifiers

- B: Reported value is less than the CRDL and greater than or equal to the instrument detection limit.
- E: The serial dilution analysis did not meet the contractual requirement of +/- 10% (SOW 7/87 E-12)
- G: Reporting limit raised due to matrix interference.
- N: Spiked sample recovery not within control limits.
- O: Reporting limit raised due to high level of analyte present in sample.
- R: Reporting limit raised due to high level of analyte present in sample.
- S: The reported value was determined by the Method of Standard Additions (MSA).
- U: Compound was analyzed but not detected.
- W: Post-digestion spike for furnace AA analysis is outside of control limits.
- \*: Duplicate analysis not within control limits.
- +: Correlation coefficient for the MSA is less than 0.995.

Table 9  
Analytical Results for Inorganic Compounds Detected in Groundwater Samples  
Site-PA16  
Hunters Point Annex

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Station Number:	PA16MW16A	PA16MW16A	PA16MW17A	PA16MW18A
Sample Depth(feet):	0.00	0.00	0.00	0.00
Sample Number:	9107X054	9107X055	9107X057	9107X059
Matrix:	H2O	H2O	H2O	H2O
Sample Date:	02/12/91	02/12/91	02/12/91	02/14/91
Lab Sample Number:	76275	76276	76277	76632

Test Method/Analyte Name	Units	value	qual	value	qual	value	qual	value	qual
CLP-ICP									
Aluminum	ug/l	322	VJ6	ND(120)	J6	123	J6/B	ND(120)	J6
Barium	ug/l	103	VA	100	B	26.6	B	32.6	B
Calcium	ug/l	659000	VJ4/E	654000	E	124000	E	172000	E
Cobalt	ug/l	ND(6)	VA	6.1	B	ND(6)	A	ND(6)	A
Magnesium	ug/l	929000	VA	952000	A	98500	A	246000	A
Manganese	ug/l	4340	VJ4/E	4400	E	107	E	494	E
Nickel	ug/l	51.8	VA	38.5	B	15.6	B	63	A
Potassium	ug/l	17600	VA	18500	A	21700	A	7950	A
Silver	ug/l	ND(13.4)	VU1	9.2	B	ND(5.1)	A	ND(5.1)	A
Sodium	ug/l	1630000	VA	1650000	A	430000	A	411000	A
Molybdenum	ug/l	41.5	VA	43.2	A	ND(14.5)	U1	83.8	A
EPA-9045									
pH	ph	7.5	A	7.8	A	7.4	A	7.6	A

Notes: Units expressed as micrograms (ug) of chemical per liter (l) of water.

NA: Not Analyzed.

ND(): Not Detected at a specific detection limit. Limit of detection is included in parenthesis.

Table 9  
Analytical Results for Inorganic Compounds Detected in Groundwater Samples  
Site-PA16  
Hunters Point Annex

Page 2

Station Number: PA16MW18A  
Sample Depth(feet): 0.00  
Sample Number: 9107X060  
Matrix: H2O  
Sample Date: 02/14/91  
Lab Sample Number: 76633

Test Method/Analyte Name	Units	value	qual
CLP-ICP			
Aluminum	ug/l	ND(120)	J6
Barium	ug/l	31.2	B
Calcium	ug/l	168000	E
Cobalt	ug/l	ND(6)	A
Magnesium	ug/l	242000	A
Manganese	ug/l	494	E
Nickel	ug/l	55.6	A
Potassium	ug/l	7550	A
Silver	ug/l	ND(5.1)	A
Sodium	ug/l	404000	A
Molybdenum	ug/l	85.9	A
EPA-9045			
pH	ph	7.7	A

Notes: Units expressed as micrograms (ug) of chemical per liter (l) of water.

NA: Not Analyzed.

ND(): Not Detected at a specific detection limit. Limit of detection is included in parenthesis.

Validation Assigned Qualifiers

- A: Data is acceptable based on a review of laboratory and field QC samples and holding times as discussed in the text.
- J2: Analytical results for this compound are qualified as estimated due to laboratory matrix duplicate quality control criteria exceedances.
- J3: Analytical results for this compound are qualified as estimated due to poor spike recoveries.
- J4: Analytical results for this compound are qualified as estimated due to ICP-serial dilution relative percent difference quality control criteria exceedances.
- J5: Analytical results for this compound are qualified as estimated due to holding time exceedances.
- J6: Analytical results for this compound are qualified as estimated due to field duplicate quality control criteria exceedances.
- R1: Analytical results for this compound are qualified as rejected due to holding time exceedances.
- R2: Analytical results for this compound are qualified as rejected due to poor spike recoveries.
- U1: Compound is qualified as non-detected due to its occurrence in the laboratory blanks.
- U2: Compound is qualified as non-detected due to its occurrence in the field blanks.
- V: Sample has undergone full CLP validation.

Laboratory Assigned Qualifiers

- B: Reported value is less than the CRDL and greater than or equal to the instrument detection limit.
- E: The serial dilution analysis did not meet the contractual requirement of  $\pm 10\%$  (SOW 7/87 E-12)
- G: Reporting limit raised due to matrix interference.
- N: Spiked sample recovery not within control limits.
- O: Reporting limit raised due to high level of analyte present in sample.
- R: Reporting limit raised due to high level of analyte present in sample.
- S: The reported value was determined by the Method of Standard Additions (MSA).
- U: Compound was analyzed but not detected.
- W: Post-digestion spike for furnace AA analysis is outside of control limits.
- \*: Duplicate analysis not within control limits.
- +: Correlation coefficient for the MSA is less than 0.995.

**Table 10. Summary of Organic Compounds  
Detected in Soil Samples  
Site PA-16  
Hunters Point Annex**

Test Method (Number of Analyses)/ Analyte Name	Units	Number of Detected Values	Min Value	Max Value
CLP-VOC (18) Toluene	µg/kg	16	3.3	200
CLP-SOC (18) Phenanthrene	µg/kg	2	270	290
Fluoranthene	µg/kg	1	460	460
Pyrene	µg/kg	1	440	440
TPH DIESEL (18)	mg/kg	11	25	310
OIL & GREASE (18)	mg/kg	15	26.7	261

**Notes:**

Units expressed as micrograms (µg) or milligrams (mg) of chemical per kilogram (kg) of soil

**Max Value =** Maximum concentration detected in any soil sample analyzed for organics compounds.

**Min Value =** Minimum concentration detected in any soil sample analyzed for organics compounds.

Minimum concentration detected may be below the reporting limit.

**Table 11. Summary of Inorganic Analyses  
in Soil Samples  
Site PA-16  
Hunters Point Annex**

Test Method Analyte Name	(Number of Analyses)/	Units	Number of Detected Values	Min Value	Max Value	Estimated Upper Limit Background Concentration <sup>1</sup>
CLP-CVAA Mercury	(18)	mg/kg	9	0.07	0.2	--
CLP-FUAA Arsenic	(18)	mg/kg	18	3.2	15.7	7
Lead		mg/kg	18	1.8	40.4	12
Selenium		mg/kg	1	0.9	0.9	--
CLP-ICP Aluminum	(18)	mg/kg	18	2,500	39,100	--
Antimony		mg/kg	18	8.6	92.1	--
Barium		mg/kg	18	11.7	443	200
Beryllium		mg/kg	17	0.1	1.0	1.0
Cadmium		mg/kg	17	0.8	14	2.1
Calcium		mg/kg	18	4,780	77,000	--
Chromium		mg/kg	18	22.1	503	1,000
Cobalt		mg/kg	18	6.7	49.1	175
Copper		mg/kg	18	4.5	81.1	100
Iron		mg/kg	18	3,700	49,200	55,000
Magnesium		mg/kg	18	2,230	91,100	--
Manganese		mg/kg	18	168	3,140	1,250
Molybdenum		mg/kg	2	1.3	8.2	--
Nickel		mg/kg	18	28.9	750	3,000
Potassium		mg/kg	18	371	2,760	--
Silver		mg/kg	2	1.5	1.8	--
Sodium		mg/kg	18	272	3,280	--
Vanadium		mg/kg	18	12.9	88.4	90
Zinc		mg/kg	18	11	116	100
EPA-9045 pH	(18)	pH	18	7.7	9.1	

**Notes:**

Units expressed as milligrams (mg) of chemical per kilogram (kg) of soil.

Max Value = Maximum concentration detected in any soil sample analyzed for inorganics.

Min Value = Minimum concentration detected in any soil sample analyzed for inorganics. Minimum concentration detected may be below the reporting limit.

<sup>1</sup> = Calculated for serpentinite fill (HLA, 1990c).

-- = Not calculated for this metal.

**Table 12. Summary of Inorganic Analyses  
in Groundwater Samples  
Site PA-16  
Hunters Point Annex**

Test Method Analyte Name	(Number of Analyses)/	Units	Number of Detected Values	Min Value	Max Value	Maximum Contaminant Levels (MCLs) <sup>1</sup>
CLP-ICP	(5)					
Aluminum		µg/l	2	123	322	1,000
Barium		µg/l	5	26.6	103	1,000
Calcium		µg/l	5	124,000	659,000	--
Cobalt		µg/l	1	6.1	6.1	--
Magnesium		µg/l	5	98,500	952,000	--
Manganese		µg/l	5	107	4,400	--
Molybdenum		µg/l	4	41.5	85.9	--
Nickel		µg/l	5	15.6	63	100
Potassium		µg/l	5	7,550	21,700	--
Silver		µg/l	2	9.2	13.4	50
Sodium		µg/l	5	404,000	1,650,000	--
EPA-9045 pH	(5)	pH	5	7.4	7.8	

Notes:

Units expressed as micrograms (µg) of chemical per liter (l) of water.

Max Value = Maximum concentration detected in any groundwater sample analyzed for inorganics.

Min Value = Minimum concentration detected in any groundwater sample analyzed for inorganics. Minimum concentration detected may be below the reporting limit.

1 = California Primary MCLs.

-- = Not given for this metal.



**Table 13. Reported Evidence of Potential Contamination at Site PA-18**

Evidence of Contamination	Reference	Recommendation
50,000 - 100,000 gallons of waste oil were reportedly dumped on the ground.	Exhibit E <sup>1</sup> (pp.8,9 of 10)	Investigate possible contamination of soils and groundwater in and adjacent to PA-18.

Note:

<sup>1</sup> SFDA, 1986.

**Table 14. Site PA-18, High Boiling Point Petroleum Hydrocarbons,  
Soil Samples**

Boring	Sample Depth (feet)	High Boiling Hydrocarbons <sup>1</sup>	Calculated As
SDM-A	3-3.5	190 <sup>2</sup>	Diesel
SDM-A	3-3.5	400	Oil
SDM-B	3-3.5	<20	--
SDM-B	3-3.5	280	Oil
SDM-C	1.5-2	<10	--
SDM-C	1.5-2	30	Oil
SDM-D	1.5-2	10 <sup>3</sup>	Diesel
SDM-D	1.5-2	30	Oil
SDM-E	1-1.5	<10	--
SDM-E	1-1.5	<10	--
SDM-F	4.5-5	130 <sup>3</sup>	Diesel
SDM-F	4.5-5	150	Oil
SDM-F	4.5-5	100 <sup>3</sup>	Diesel
(Duplicate) SDM-F (Duplicate)	4.5-5	120	Oil

(From *EMCON Associates [1987]*, Table 17.)

**Notes:**

- <sup>1</sup> All concentrations are reported in parts per million (ppm).
- <sup>2</sup> Identified as weathered diesel.
- <sup>3</sup> Unidentified hydrocarbons.

Table 15  
Analytical Results for Organic Compounds Detected in Soil Samples  
from Soil Boring IR07B022  
Hunters Point Annex

Page 1

Station Number:	IR07B022	IR07B022	IR07B022	IR07B022
Sample Depth(feet):	1.75	3.75	6.75	11.25
Sample Number:	9049H562	9049H563	9049H564	9049H565
Matrix:	SOIL	SOIL	SOIL	SOIL
Sample Date:	12/05/90	12/05/90	12/05/90	12/05/90
Lab Sample Number:	9012059-05A	9012059-06A	9012059-07A	9012059-08A

Test Method/Analyte Name	Units	value	qual	value	qual	value	qual	value	qual
CLP-VOC									
Methylene chloride	ug/kg	12	B	25	B	34		44	
Acetone	ug/kg	43	B	40	B	89		700	E
Carbon disulfide	ug/kg	ND (5.1)	U	ND (5.2)	U	2	J	ND (5.3)	U
Methyl ethyl ketone	ug/kg	22		30		22		ND (11)	U
Toluene	ug/kg	ND (5.1)	U	ND (5.2)	U	6		7	
CLP-SOC									
Pyrene	ug/kg	ND (370)	U	270	J	ND (9300)	U	ND (380)	U
Benzo (a) anthracene	ug/kg	ND (370)	U	240	J	ND (9300)	U	ND (380)	U
Bis (2-ethylhexyl) phthalate	ug/kg	ND (370)	U	880		ND (9300)	U	320	J
CLP-PEST/PCB									
Aldrin	ug/kg	ND (32)	U	ND (33)	U	9	J	ND (33)	U
Dieldrin	ug/kg	ND (64)	U	ND (67)	U	34.6	J	ND (66)	U
4,4'-DDE	ug/kg	ND (64)	U	ND (67)	U	111		ND (66)	U
Endrin	ug/kg	ND (64)	U	ND (67)	U	6.6	J	ND (66)	U
4,4'-DDD	ug/kg	ND (64)	U	ND (67)	U	245		ND (66)	U
4,4'-DDT	ug/kg	ND (64)	U	ND (67)	U	70.6		ND (66)	U
TPH DIESEL									
TPH-Diesel	mg/kg	204		ND (23)	U	ND (110)	U	ND (20)	U
OIL & GREASE									
Total Oil & Grease	mg/kg	2770		1120		2370		ND (640)	U

Notes: Units expressed as micrograms (ug) or milligrams (mg) of chemical per kilogram (kg) of soil.  
NA: Not Analyzed.  
ND(): Not Detected at a specific reporting limit. Reporting limit is included in parenthesis.

Validation Assigned Qualifiers

- A: Data is acceptable based on a review of laboratory and field QC samples and holding times as discussed in the text.
- F: The presence of this compound is due to suspected field contamination.
- J3: Analytical results for this compound are qualified as estimated due to poor spike recoveries.
- J5: Analytical results for this compound are qualified as estimated due to holding time exceedances.
- J7: Analytical results for this compound are qualified as estimated due to linearity problems in the initial calibration.
- J8: Analytical results for this compound are qualified as estimated due to detection of the compound above the instrument calibration range.
- R1: Analytical results for this compound are qualified as rejected due to holding time exceedances.
- R2: Analytical results for this compound are qualified as rejected due to poor spike recoveries.
- U1: Compound is qualified as non-detected due to its occurrence in the laboratory blanks.
- U2: Compound is qualified as non-detected due to its occurrence in the field blanks.
- V: Sample has undergone full CLP validation.

Laboratory Assigned Qualifiers

- B: Compound is also detected in the laboratory method blank.
- #,b: Analytical results should not be considered reliable for this common lab contaminant.
- D: Compound is identified in an analysis at a secondary dilution factor.
- E: Concentration exceeds the calibration range of the GC/MS instrument for the specific analysis.
- G: Reporting limit raised due to matrix interference.
- J: Result is detected below the reporting limit or is an estimated concentration.
- j: All reporting limits for this sample raised due to matrix interferences.
- l: If 'l' is attached to a diesel result, then either the hydrocarbons present in this sample represent an unknown mixture at a concentration of less than 45 mg/kg, or the hydrocarbons present in this sample do not fit the diesel pattern, but are found in the diesel range. (Quantification was based upon diesel references.) If 'l' is attached to a gasoline result, then this sample contains late eluting hydrocarbons. Early gasoline peaks are below reporting limits.
- o: Reporting limit raised due to high level of analyte present in sample.

Laboratory Assigned Qualifiers (Continued...)

r: Reporting limit changed due to sample volume limitations.

U: Compound was analyzed but not detected.

X,Y: Specific flag used to properly define the results. Qualifier is fully described in the Sample Data Summary Package and the Case Narrative.

R

A

F

T

Table 16  
Analytical Results for Inorganic Compounds Detected in Soil Samples  
from Soil Boring IR07B022  
Hunters Point Annex

Page 1

Station Number:	IR07B022	IR07B022	IR07B022	IR07B022
Sample Depth(feet):	1.75	3.75	6.75	11.25
Sample Number:	9049H562	9049H563	9049H564	9049H565
Matrix:	SOIL	SOIL	SOIL	SOIL
Sample Date:	12/05/90	12/05/90	12/05/90	12/05/90
Lab Sample Number:	9012059-05B	9012059-06B	9012059-07B	9012059-08B

Test Method/Analyte Name	Units	value	qual	value	qual	value	qual	value	qual
CLP-CVAA									
Mercury	mg/kg	ND (0.1)	U	ND (0.1)	U	0.21		ND (0.1)	U
CLP-FUAA									
Arsenic	mg/kg	2.2	+	2.1	+	2	+	ND (1)	WU
CLP-ICP									
Aluminum	mg/kg	5600	*	7700	*	6500	*	8700	*
Barium	mg/kg	66.5	*	77.5	*	78.6	*	44.6	*
Cadmium	mg/kg	2.9	*	3.6	*	3.7	*	6.4	*
Calcium	mg/kg	1100	*	2000	*	8600	*	3600	*
Chromium	mg/kg	85.6	*	165	*	95.5	*	456	*
Cobalt	mg/kg	19.4	*	31.4	*	21.5	*	80.9	*
Copper	mg/kg	118	*	16.3	*	15.9	*	26.7	*
Iron	mg/kg	15800	*	23100	*	17800	*	42500	*
Lead	mg/kg	11	*	16.3	*	129	*	11.1	*
Magnesium	mg/kg	5700	*	25800	*	11500	*	97500	*
Manganese	mg/kg	221	*	312	*	518	*	612	*
Nickel	mg/kg	129	*	416	*	263	*	1500	*
Potassium	mg/kg	ND (500)	U	ND (500)	U	585		535	
Sodium	mg/kg	ND (500)	U	ND (500)	U	ND (500)	U	1400	
Vanadium	mg/kg	35.6	*	36.9	*	29.9	*	37.6	*
Zinc	mg/kg	50	*	39.6	*	131	*	48.3	*
EPA-9045									
pH	ph	7.25		7.3		6.8		7.65	

Notes: Units expressed as milligrams (mg) of chemical per kilogram (kg) of soil.

NA: Not Analyzed.

ND(): Not Detected at a specific detection limit. Limit of detection is included in parenthesis.

Validation Assigned Qualifiers

- A: Data is acceptable based on a review of laboratory and field QC samples and holding times as discussed in the text.
- J2: Analytical results for this compound are qualified as estimated due to laboratory matrix duplicate quality control criteria exceedances.
- J3: Analytical results for this compound are qualified as estimated due to poor spike recoveries.
- J4: Analytical results for this compound are qualified as estimated due to ICP-serial dilution relative percent difference quality control criteria exceedances.
- J5: Analytical results for this compound are qualified as estimated due to holding time exceedances.
- J6: Analytical results for this compound are qualified as estimated due to field duplicate quality control criteria exceedances.
- R1: Analytical results for this compound are qualified as rejected due to holding time exceedances.
- R2: Analytical results for this compound are qualified as rejected due to poor spike recoveries.
- U1: Compound is qualified as non-detected due to its occurrence in the laboratory blanks.
- U2: Compound is qualified as non-detected due to its occurrence in the field blanks.
- V: Sample has undergone full CLP validation.

Laboratory Assigned Qualifiers

- B: Reported value is less than the CRDL and greater than or equal to the instrument detection limit.
- E: The serial dilution analysis did not meet the contractual requirement of +/- 10% (SOW 7/87 E-12)
- G: Reporting limit raised due to matrix interference.
- N: Spiked sample recovery not within control limits.
- O: Reporting limit raised due to high level of analyte present in sample.
- R: Reporting limit raised due to high level of analyte present in sample.
- S: The reported value was determined by the Method of Standard Additions (MSA).
- U: Compound was analyzed but not detected.
- W: Post-digestion spike for furnace AA analysis is outside of control limits.
- \*: Duplicate analysis not within control limits.
- +: Correlation coefficient for the MSA is less than 0.995.

**Table 17. Boring and Monitoring Well Drilling and Sampling Information, Site PA-18**

Well and Boring Numbers	Date Drilled	Total Depth (feet)	Soil Sampling Depth Intervals (feet bgs)	Laboratory Soil Sample Number
<b><u>Wells</u></b>				
PA18MW08A	31-Jan-91	28.50	2.75 - 3.50 8.75 - 9.50	9105H585 9105H586
PA18MW09A	30-Jan-91	25.00	1.75 - 2.50 11.75 - 12.50	9105G591 9105G592
<b><u>Borings</u></b>				
PA18B001	1-Feb-91	16.00	1.25 - 2.00 8.75 - 9.50	9105G597 9105G598
PA18B002	29-Jan-91	12.50	1.25 - 2.00 2.75 - 3.50	9105H581 9105H582
PA18B003	31-Jan-91	20.00	1.75 - 2.50 6.75 - 7.50	9105G595 9105G596
PA18B004	29-Jan-91	14.00	1.25 - 2.00 6.00 - 6.50	9105H579 9105H580
PA18B005	28-Jan-91	17.00	1.00 - 1.75 4.00 - 4.75	9105G585 9105G586
PA18B006	29-Jan-91	17.50	1.25 - 2.00 7.00 - 7.75	9105G587 9105G588
PA18B007	28-Jan-91	16.75	1.25 - 2.00 7.00 - 7.75	9105G589 9105G590
PA18B010	30-Jan-91	15.50	1.25 - 2.00 7.00 - 7.75	9105G593 9105G594

Notes:

bgs = Below ground surface



**Table 18. Well Construction Details  
Site PA-18**

Well Number	Total Depth (feet)	Top of Casing Elevation (feet AMSL <sup>1</sup> )	Screened Interval (feet BTOC <sup>2</sup> )	Sand Pack (feet BTOC)	Bentonite Seal (feet BTOC)	Lithologic Unit Screened
PA18MW08A	28.5	24.67	10 - 25	7.8 - 25	6 - 7.8	Qaf <sup>3</sup>
PA18MW09A	25.0	17.66	10 - 25	7 - 25	5 - 7	Qaf/Quus <sup>4</sup>

**Notes:**

- 1 AMSL = Above mean sea level adjusted to MSL from previously surveyed datum
- 2 BTOC = Below top of casing
- 3 Qaf = Bedrock-Derived Fill
- 4 Quus = Undifferentiated Upper Sand Unit

**Table 19. Field Parameters and Water-Level Measurements from Well Monitoring  
Site PA-18**

Well Number	Top of Casing Elevation (Feet AMSL)	Date Sampled	Time Sampled	Depth to Water (Feet BTOC)	Calculated Water- Level Elevations	pH (Units)	Electrical Conductivity (micromhos per centimeter)*	Tempera- ture °C	Turbidity (NTU)	Gallons Removed	Casing Volumes Removed	Field Observa- tions
PA18MW08A	24.67	14-Feb-91 1-Apr-91 <sup>(1)</sup>	0940 1042	18.57 12.86	6.10 11.82	7.3	600	20.0	>100	8.0	2.0	Clear, odorless
PA18MW09A	17.66	11-Feb-91 1-Apr-91 <sup>(1)</sup>	1115 1038	15.10 13.31	2.56 4.35	7.6	1700	18.6	>100	9.0	1.7	Clear, odorless

**Notes:**

AMSL = Above mean sea level adjusted to MSL from previously surveyed datum  
 BTOC = Below top of casing  
 bgs = Below ground surface  
 \* = Electrical conductivity at measured temperature  
 NTU = Nephelometric turbidity units  
 1 = Only water-level elevations measured on this date

Table 20  
Analytical Results for Organic Compounds Detected in Soil Samples  
Site PA-18  
Hunters Point Annex

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Station Number:	PA18B001	PA18B001	PA18B002	PA18B002
Sample Depth(feet):	1.25	8.75	1.25	2.75
Sample Number:	9105G597	9105G598	9105H581	9105H582
Matrix:	SOIL	SOIL	SOIL	SOIL
Sample Date:	02/01/91	02/01/91	01/29/91	01/29/91
Lab Sample Number:	73992	73993	73767	73768

Test Method/Analyte Name	Units	value	qual	value	qual	value	qual	value	qual
CLP-VOC									
Carbon disulfide	ug/kg	ND (690)	J5	ND (5.3)	A	ND (5.7)	A	ND (5.4)	A
Methyl ethyl ketone	ug/kg	ND (1370)	J5	ND (11)	A	ND (11)	A	ND (11)	A
Toluene	ug/kg	ND (690)	J5	30	A	51	A	21	A
Ethyl benzene	ug/kg	ND (690)	J5	ND (5.3)	A	ND (5.7)	A	ND (5.4)	A
Xylenes	ug/kg	ND (690)	J5	ND (5.3)	A	ND (5.7)	A	ND (5.4)	A
CLP-SOC									
2,4-Dinitrotoluene	ug/kg	ND (720)	A	ND (350)	A	ND (370)	A	ND (700)	A
CLP-PEST/PCB									
4,4'-DDT	ug/kg	ND (18)	J73	ND (17)	J73	ND (18)	J73	ND (17)	J73
alpha-Chlordane	ug/kg	ND (88)	J73	40	J73/J	ND (91)	J73	ND (86)	J73
gamma-Chlordane	ug/kg	ND (88)	J73	37	J73/J	ND (91)	J73	ND (86)	J73
Aroclor-1260	ug/kg	78	J73/J	ND (170)	J73	ND (180)	J73	ND (170)	J73
TPH DIESEL									
TPH-Diesel	mg/kg	120	A	5300	D	37	A	150	A
TPH GAS									
TPH-Gasoline	mg/kg	ND (1.1)	A	ND (1.1)	A	ND (1.1)	A	ND (1.1)	A
OIL & GREASE									
Total Oil & Grease	mg/kg	320	A	49600	A	103	A	211	A

Notes: Units expressed as micrograms (ug) or milligrams (mg) of chemical per kilogram (kg) of soil.  
NA: Not Analyzed.  
ND(): Not Detected at a specific reporting limit. Reporting limit is included in parenthesis.

Table 20  
Analytical Results for Organic Compounds Detected in Soil Samples  
Site PA-18  
Hunters Point Annex

Page 2

Station Number:	PA18B003	PA18B003	PA18B004	PA18B004
Sample Depth(feet):	1.75	6.75	1.25	6.00
Sample Number:	9105G595	9105G596	9105H579	9105H580
Matrix:	SOIL	SOIL	SOIL	SOIL
Sample Date:	01/30/91	01/30/91	01/29/91	01/29/91
Lab Sample Number:	73828	73829	73765	73766

Test Method/Analyte Name	Units	value	qual	value	qual	value	qual	value	qual
CLP-VOC									
Carbon disulfide	ug/kg	ND (5.6)	A	ND (700)	J5	ND (5.7)	A	ND (6.8)	A
Methyl ethyl ketone	ug/kg	23	A	ND (1400)	J5	ND (11)	A	ND (14)	A
Toluene	ug/kg	160	F	2900	FJ5/D	14	F	54	F
Ethyl benzene	ug/kg	ND (5.6)	A	1200	J5/D	ND (5.7)	A	ND (6.8)	A
Xylenes	ug/kg	ND (5.6)	A	9800	J5/D	ND (5.7)	A	ND (6.8)	A
CLP-SOC									
2,4-Dinitrotoluene	ug/kg	ND (370)	J5	ND (7400)	A	ND (380)	A	ND (450)	A
CLP-PEST/PCB									
4,4'-DDT	ug/kg	ND (18)	J73	ND (180)	J73	ND (18)	J73	ND (22)	J73
alpha-Chlordane	ug/kg	ND (89)	J73	ND (900)	J73	ND (92)	J73	ND (110)	J73
gamma-Chlordane	ug/kg	ND (89)	J73	ND (900)	J73	ND (92)	J73	ND (110)	J73
Aroclor-1260	ug/kg	ND (180)	J73	ND (1800)	J73	ND (180)	J73	ND (220)	J73
TPH DIESEL									
TPH-Diesel	mg/kg	380	A	5700	D	170	A	ND (14)	A
TPH GAS									
TPH-Gasoline	mg/kg	ND (1.1)	A	140	D	ND (1.1)	A	ND (1.4)	A
OIL & GREASE									
Total Oil & Grease	mg/kg	477	A	65.8	A	81.7	A	1230	A

Notes: Units expressed as micrograms (ug) or milligrams (mg) of chemical per kilogram (kg) of soil.

NA: Not Analyzed.

ND(): Not Detected at a specific reporting limit. Reporting limit is included in parenthesis.

Table 20  
Analytical Results for Organic Compounds Detected in Soil Samples  
Site PA-18  
Hunters Point Annex

Page 3

Station Number:	PA18B005	PA18B005	PA18B006	PA18B006
Sample Depth (feet):	1.00	4.00	1.25	7.00
Sample Number:	9105G585	9105G586	9105G587	9105G588
Matrix:	SOIL	SOIL	SOIL	SOIL
Sample Date:	01/28/91	01/28/91	01/28/91	01/29/91
Lab Sample Number:	73629	73630	73631	73632

Test Method/Analyte Name	Units	value	qual	value	qual	value	qual	value	qual
CLP-VOC									
Carbon disulfide	ug/kg	ND (5.7)	A	7	J	ND (5.8)	J5	ND (5.7)	A
Methyl ethyl ketone	ug/kg	ND (11)	A	27	A	ND (12)	J5	ND (11)	A
Toluene	ug/kg	43	F	110	F	31	FJ5	4.1	FJ
Ethyl benzene	ug/kg	ND (5.7)	A	ND (7.3)	A	ND (5.8)	J5	ND (5.7)	A
Xylenes	ug/kg	ND (5.7)	A	ND (7.3)	A	ND (5.8)	J5	ND (5.7)	A
CLP-SOC									
2,4-Dinitrotoluene	ug/kg	300	J	ND (480)	A	ND (380)	A	ND (380)	A
CLP-PEST/PCB									
4,4'-DDT	ug/kg	9.2	J73/J	ND (23)	J73	ND (19)	J73	ND (18)	J73
alpha-Chlordane	ug/kg	15	J73/J	ND (120)	J73	ND (93)	J73	ND (92)	J73
gamma-Chlordane	ug/kg	13	J73/J	ND (120)	J73	ND (93)	J73	ND (92)	J73
Aroclor-1260	ug/kg	ND (180)	J73	ND (230)	J73	ND (190)	J73	ND (180)	J73
TPH DIESEL									
TPH-Diesel	mg/kg	32	A	200	A	ND (12)	A	ND (11)	A
TPH GAS									
TPH-Gasoline	mg/kg	ND (1.1)	A	ND (1.5)	A	ND (1.2)	A	ND (1.1)	A
OIL & GREASE									
Total Oil & Grease	mg/kg	64.8	A	514	A	131	A	ND (57)	A

Notes: Units expressed as micrograms (ug) or milligrams (mg) of chemical per kilogram (kg) of soil.  
NA: Not Analyzed.  
ND(): Not Detected at a specific reporting limit. Reporting limit is included in parenthesis.

Table 20

Analytical Results for Organic Compounds Detected in Soil Samples  
Site PA-18  
Hunters Point Annex

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Station Number:	PA18B007	PA18B007	PA18B010	PA18B010
Sample Depth(feet):	1.25	7.00	1.25	7.00
Sample Number:	9105G589	9105G590	9105G593	9105G594
Matrix:	SOIL	SOIL	SOIL	SOIL
Sample Date:	01/28/91	01/28/91	01/30/91	01/30/91
Lab Sample Number:	73633	73634	73826	73827

Test Method/Analyte Name	Units	value	qual	value	qual	value	qual	value	qual
CLP-VOC									
Carbon disulfide	ug/kg	ND(5.7)	A	ND(5.8)	A	ND(5.5)	A	ND(5.6)	A
Methyl ethyl ketone	ug/kg	ND(11)	A	ND(12)	A	ND(11)	A	ND(11)	A
Toluene	ug/kg	7.7	F	ND(5.8)	A	2.8	F/J	15	F
Ethyl benzene	ug/kg	ND(5.7)	A	ND(5.8)	A	ND(5.5)	A	ND(5.6)	A
Xylenes	ug/kg	ND(5.7)	A	ND(5.8)	A	ND(5.5)	A	ND(5.6)	A
CLP-SOC									
2,4-Dinitrotoluene	ug/kg	ND(380)	VA	ND(380)	A	ND(360)	A	ND(370)	A
CLP-PEST/PCB									
4,4'-DDT	ug/kg	ND(18)	VJ73	ND(18)	J73	ND(18)	J73	ND(18)	J73
alpha-Chlordane	ug/kg	ND(91)	VJ73	ND(92)	J73	ND(88)	J73	ND(90)	J73
gamma-Chlordane	ug/kg	ND(91)	VJ73	ND(92)	J73	ND(88)	J73	ND(90)	J73
Aroclor-1260	ug/kg	ND(180)	VJ73	ND(180)	J73	ND(180)	J73	ND(180)	J73
TPH DIESEL									
TPH-Diesel	mg/kg	ND(11)	VA	ND(12)	A	ND(11)	A	ND(11)	A
TPH GAS									
TPH-Gasoline	mg/kg	ND(1.1)	VA	ND(1.2)	A	ND(1.1)	A	ND(1.1)	A
OIL & GREASE									
Total Oil & Grease	mg/kg	46.1	J	46.9	J	ND(55)	A	42.2	J

## Notes:

Units expressed as micrograms (ug) or milligrams (mg) of chemical per kilogram (kg) of soil.

NA: Not Analyzed.

ND(): Not Detected at a specific reporting limit. Reporting limit is included in parenthesis.

Table 20  
Analytical Results for Organic Compounds Detected in Soil Samples  
Site PA-18  
Hunters Point Annex

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Station Number:	PA18MW08A	PA18MW08A	PA18MW09A	PA18MW09A
Sample Depth(feet):	2.75	8.75	1.75	11.75
Sample Number:	9105H585	9105H586	9105G591	9105G592
Matrix:	SOIL	SOIL	SOIL	SOIL
Sample Date:	01/31/91	01/31/91	01/30/91	01/30/91
Lab Sample Number:	73983	73984	73763	73764

Test Method/Analyte Name	Units	value	qual	value	qual	value	qual	value	qual
CLP-VOC									
Carbon disulfide	ug/kg	ND (5.8)	A	ND (5.7)	J5	ND (5.4)	A	ND (5.4)	A
Methyl ethyl ketone	ug/kg	ND (12)	A	ND (12)	J5	ND (11)	A	ND (11)	A
Toluene	ug/kg	32	F	3.5	FJ5/J	56	F	69	F
Ethyl benzene	ug/kg	ND (5.8)	A	ND (5.7)	J5	ND (5.4)	A	ND (5.4)	A
Xylenes	ug/kg	3.8	J	ND (5.7)	J5	ND (5.4)	A	ND (5.4)	A
CLP-SOC									
2,4-Dinitrotoluene	ug/kg	ND (380)	A	ND (380)	A	ND (710)	A	ND (360)	VA
CLP-PEST/PCB									
4,4'-DDT	ug/kg	ND (19)	J73	ND (18)	J73	ND (17)	J73	ND (17)	VJ73
alpha-Chlordane	ug/kg	ND (93)	J73	ND (91)	J73	ND (86)	J73	ND (87)	VJ73
gamma-Chlordane	ug/kg	ND (93)	J73	ND (91)	J73	ND (86)	J73	ND (87)	VJ73
Aroclor-1260	ug/kg	ND (190)	J73	ND (180)	J73	ND (170)	J73	ND (170)	VJ73
TPH DIESEL									
TPH-Diesel	mg/kg	ND (12)	A	ND (12)	A	120	A	ND (11)	VA
TPH GAS									
TPH-Gasoline	mg/kg	ND (1.2)	A	ND (1.2)	A	ND (1.1)	A	ND (1.1)	VJ3
OIL & GREASE									
Total Oil & Grease	mg/kg	38.3	J	32.8	J	180	A	46.7	J

Notes: Units expressed as micrograms (ug) or milligrams (mg) of chemical per kilogram (kg) of soil.

NA: Not Analyzed.

ND(): Not Detected at a specific reporting limit. Reporting limit is included in parenthesis.

Validation Assigned Qualifiers

- A: Data is acceptable based on a review of laboratory and field QC samples and holding times as discussed in the text.
- F: The presence of this compound is due to suspected field contamination.
- J3: Analytical results for this compound are qualified as estimated due to poor spike recoveries.
- J5: Analytical results for this compound are qualified as estimated due to holding time exceedances.
- J7: Analytical results for this compound are qualified as estimated due to linearity problems in the initial calibration.
- J8: Analytical results for this compound are qualified as estimated due to detection of the compound above the instrument calibration range.
- R1: Analytical results for this compound are qualified as rejected due to holding time exceedances.
- R2: Analytical results for this compound are qualified as rejected due to poor spike recoveries.
- U1: Compound is qualified as non-detected due to its occurrence in the laboratory blanks.
- U2: Compound is qualified as non-detected due to its occurrence in the field blanks.
- V: Sample has undergone full CLP validation.

Laboratory Assigned Qualifiers

- B: Compound is also detected in the laboratory method blank.
- #,b: Analytical results should not be considered reliable for this common lab contaminant.
- D: Compound is identified in an analysis at a secondary dilution factor.
- E: Concentration exceeds the calibration range of the GC/MS instrument for the specific analysis.
- G: Reporting limit raised due to matrix interference.
- J: Result is detected below the reporting limit or is an estimated concentration.
- j: All reporting limits for this sample raised due to matrix interferences.
- l: If 'l' is attached to a diesel result, then either the hydrocarbons present in this sample represent an unknown mixture at a concentration of less than 45 mg/kg, or the hydrocarbons present in this sample do not fit the diesel pattern, but are found in the diesel range. (Quantification was based upon diesel references.) If 'l' is attached to a gasoline result, then this sample contains late eluting hydrocarbons. Early gasoline peaks are below reporting limits.
- o: Reporting limit raised due to high level of analyte present in sample.



Laboratory Assigned Qualifiers (Continued...)

r: Reporting limit changed due to sample volume limitations.

U: Compound was analyzed but not detected.

X,Y: Specific flag used to properly define the results. Qualifier is fully described in the Sample Data Summary Package and the Case Narrative.

Table 21  
Analytical Results for Inorganic Compounds Detected in Soil Samples  
Site PA-18  
Hunters Point Annex

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Station Number:	PA18B001	PA18B001	PA18B002	PA18B002
Sample Depth(feet):	1.25	8.75	1.25	2.75
Sample Number:	9105G597	9105G598	9105H581	9105H582
Matrix:	SOIL	SOIL	SOIL	SOIL
Sample Date:	02/01/91	02/01/91	01/29/91	01/29/91
Lab Sample Number:	73992	73993	73767	73768

Test Method/Analyte Name	Units	value	qual	value	qual	value	qual	value	qual
CLP-CVAA									
Mercury	mg/kg	2	J5	0.09	A	ND(0.056)	J2/N *	0.09	J2/N *
CLP-FUAA									
Arsenic	mg/kg	6	+	3.2	A	ND(1.1)	A	2.4	A
Lead	mg/kg	409	*	39	*	1	*	21.1	*
CLP-ICP									
Aluminum	mg/kg	6510	A	4440	A	3380	*	17000	*
Antimony	mg/kg	29.4	J3/N	10.7	J3/B N	61.4	J3/N *	55	J3/N *
Barium	mg/kg	101	A	50.4	A	7	B	103	A
Beryllium	mg/kg	0.24	B	0.19	B	ND(0.11)	A	0.6	B
Cadmium	mg/kg	14.9	A	2	A	10.7	*	8.5	*
Calcium	mg/kg	12100	J3	14700	J3	6370	*	9880	*
Chromium	mg/kg	104	A	22.3	A	ND(2)	J3	87.6	J3/N
Cobalt	mg/kg	12.9	A	ND(5.6)	U1/B	96.6	*	24.6	*
Copper	mg/kg	162	J2	12.8	J2	8.7	*	37	*
Iron	mg/kg	17100	A	8830	A	41700	*	35600	*
Magnesium	mg/kg	9970	A	2450	A	129000	*	7210	*
Manganese	mg/kg	250	A	172	A	1030	J3/*	804	J3/*
Nickel	mg/kg	133	A	27.7	A	998	N *	51.5	N *
Potassium	mg/kg	738	B	547	B	ND(38.6)	A	642	B
Silver	mg/kg	9.3	A	ND(1.1)	A	ND(1.1)	A	ND(1.1)	A
Sodium	mg/kg	402	B	ND(259)	U1/B	ND(337)	U1/B	ND(635)	U1/B
Vanadium	mg/kg	28.3	A	20.9	A	12.2	B	109	A
Zinc	mg/kg	704	E	46.6	E	ND(27.9)	U1/*E	52.6	*E
EPA-9045									
pH	ph	8.1	J5	8.1	J5	8.5	A	8.4	A

Notes:

Units expressed as milligrams (mg) of chemical per kilogram (kg) of soil.

NA: Not Analyzed.

ND(): Not Detected at a specific detection limit. Limit of detection is included in parenthesis.

Table 21  
Analytical Results for Inorganic Compounds Detected in Soil Samples  
Site PA-18  
Hunters Point Annex

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Station Number:	PA18B003	PA18B003	PA18B004	PA18B004
Sample Depth (feet):	1.75	6.75	1.25	6.00
Sample Number:	9105G595	9105G596	9105H579	9105H580
Matrix:	SOIL	SOIL	SOIL	SOIL
Sample Date:	01/30/91	01/30/91	01/29/91	01/29/91
Lab Sample Number:	73828	73829	73765	73766

Test Method/Analyte Name	Units	value	qual	value	qual	value	qual	value	qual
CLP-CVAA									
Mercury	mg/kg	3.7	J25/N	0.14	J25/N	ND (0.057)	J2/N*	ND (0.068)	J2/N *
CLP-FUAA									
Arsenic	mg/kg	13.9	A	6.8	A	2.9	A	ND (1.4)	A
Lead	mg/kg	387	*	324	*	8.6	*	0.92	*
CLP-ICP									
Aluminum	mg/kg	8510	*	9600	*	13300	*	37800	*
Antimony	mg/kg	51.4	J3/N *	51.6	J3/N *	48.1	J3/N *	120	J3/N *
Barium	mg/kg	288	A	137	A	81.5	A	30	B
Beryllium	mg/kg	ND (0.46)	U1/B	ND (0.35)	U1/B	ND (0.54)	U1/B	0.97	B
Cadmium	mg/kg	9.5	*	9.8	*	7.5	*	20.4	*
Calcium	mg/kg	2860	*	4020	*	2370	*	23600	*
Chromium	mg/kg	180	J3/N	154	J3/N	107	J3/N	ND (2.5)	J3
Cobalt	mg/kg	29.4	*	38.5	*	11.4	B *	65.1	*
Copper	mg/kg	229	*	181	*	14.6	*	104	*
Iron	mg/kg	29200	*	32600	*	28700	*	65500	*
Magnesium	mg/kg	8940	*	19000	*	3990	*	48300	*
Manganese	mg/kg	619	J3/*	488	J3/*	317	J3/*	805	J3/*
Nickel	mg/kg	267	N *	450	N *	98.2	N *	480	N *
Potassium	mg/kg	706	B	713	B	588	B	223	B
Silver	mg/kg	ND (1.1)	A	ND (1.1)	A	ND (1.1)	A	ND (1.4)	A
Sodium	mg/kg	ND (339)	U1/B	ND (320)	U1/B	ND (405)	U1/B	ND (1200)	U1/B
Vanadium	mg/kg	32	A	48.4	A	71.2	A	187	A
Zinc	mg/kg	574	*E	564	*E	ND (38.5)	U1/*E	82.8	*E
EPA-9045									
pH	ph	7.2	A	7.4	A	7.3	A	7.1	A

Notes: Units expressed as milligrams (mg) of chemical per kilogram (kg) of soil.

NA: Not Analyzed.

ND(): Not Detected at a specific detection limit. Limit of detection is included in parenthesis.

Table 21

Analytical Results for Inorganic Compounds Detected in Soil Samples  
Site PA-18  
Hunters Point Annex

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Station Number:	PA18B005	PA18B005	PA18B006	PA18B006
Sample Depth(feet):	1.00	4.00	1.25	7.00
Sample Number:	9105G585	9105G586	9105G587	9105G588
Matrix:	SOIL	SOIL	SOIL	SOIL
Sample Date:	01/28/91	01/28/91	01/28/91	01/29/91
Lab Sample Number:	73629	73630	73631	73632

Test Method/Analyte Name	Units	value	qual	value	qual	value	qual	value	qual
CLP-CVAA									
Mercury	mg/kg	0.08	J25/N*	0.66	J25/N*	ND(0.058)	J25/N*	0.13	J25/N*
CLP-FUAA									
Arsenic	mg/kg	ND(1.1)	W	ND(1.5)	W	ND(1.2)	W	2.8	A
Lead	mg/kg	3.1	*	101	*	3.7	*	3.1	N*
CLP-ICP									
Aluminum	mg/kg	3220	*	6130	*	11600	*	6330	*
Antimony	mg/kg	55.2	J3/N*	ND(19.3)	U1J3/N*	46.8	J3/N*	36.2	J3/N*
Barium	mg/kg	12.7	B	68.1	A	92	A	52.2	A
Beryllium	mg/kg	ND(0.11)	A	ND(0.23)	U1/B	ND(0.45)	U1/B	ND(0.31)	U1/B
Cadmium	mg/kg	9.4	*	3.4	*	8.1	*	5.3	*
Calcium	mg/kg	7810	*	5160	*	2720	*	1550	*
Chromium	mg/kg	ND(2.1)	J3	44.8	J3/N	136	J3/N	148	J3/N
Cobalt	mg/kg	94.8	*	7.1	B*	20.1	*	14.5	*
Copper	mg/kg	9.3	*	17.7	*	11.8	*	15	*
Iron	mg/kg	35200	*	14100	*	30000	*	24900	*
Magnesium	mg/kg	104000	*	3230	*	5350	*	352	*
Manganese	mg/kg	1050	J3/*	182	J3/*	459	J3/*	373	J3/N*
Nickel	mg/kg	1070	N*	31.3	N*	320	N*	157	N*
Potassium	mg/kg	ND(38.8)	A	879	B	462	B	487	B
Silver	mg/kg	ND(1.1)	A	ND(1.5)	A	ND(1.2)	A	ND(1.1)	A
Sodium	mg/kg	ND(197)	U1/B	ND(502)	U1/B	ND(301)	U1/B	ND(343)	U1/B
Vanadium	mg/kg	14.4	A	33.5	A	60.2	A	64.4	A
Zinc	mg/kg	ND(29.7)	U1/*E	76.7	*E	ND(36.8)	U1/*E	ND(28.3)	U1/*E
EPA-9045									
pH	ph	7.1	J5	7.5	J5	7.6	A	6.7	A

## Notes:

Units expressed as milligrams (mg) of chemical per kilogram (kg) of soil.

NA: Not Analyzed.

ND(): Not Detected at a specific detection limit. Limit of detection is included in parenthesis.

Table 21  
Analytical Results for Inorganic Compounds Detected in Soil Samples  
Site PA-18  
Hunters Point Annex

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Station Number:	PA18B007	PA18B007	PA18B010	PA18B010
Sample Depth (feet):	1.25	7.00	1.25	7.00
Sample Number:	9105G589	9105G590	9105G593	9105G594
Matrix:	SOIL	SOIL	SOIL	SOIL
Sample Date:	01/28/91	01/28/91	01/30/91	01/30/91
Lab Sample Number:	73633	73634	73826	73827

Test Method/Analyte Name	Units	value	qual	value	qual	value	qual	value	qual
CLP-CVAA									
Mercury	mg/kg	0.06	VJ25/N*	0.057	J25/N*	0.08	J25/N	ND(0.056)	J25/N
CLP-FUAA									
Arsenic	mg/kg	3.1	VA	6	A	3	A	2.5	A
Lead	mg/kg	4.4	V/*	2.8	*	4.2	*	3.4	*
CLP-ICP									
Aluminum	mg/kg	11700	VJ2/*	7350	*	11900	*	9090	*
Antimony	mg/kg	46.8	VJ3/N*	37.2	J3/N*	40.4	J3/N *	37.5	J3/N *
Barium	mg/kg	93.3	VA	59.7	A	68.4	A	65.7	A
Beryllium	mg/kg	ND(0.54)	VU1/B	ND(0.33)	U1/B	ND(0.48)	U1/B	ND(0.4)	U1/B
Cadmium	mg/kg	6.2	V/*	5	*	6.2	*	5.7	*
Calcium	mg/kg	2160	V/*	2030	*	2.39	B *	1.49	B *
Chromium	mg/kg	96.1	VJ3/N	92.6	J3/N	105	J3/N	132	J3/N
Cobalt	mg/kg	15.1	V/*	11.5	B*	11.6	*	20.8	*
Copper	mg/kg	11.7	VJ2/*	13.4	*	10.9	*	15.5	*
Iron	mg/kg	26900	V/*	22800	*	23.5	*	23300	*
Magnesium	mg/kg	3440	V/*	4810	*	3320	*	4540	*
Manganese	mg/kg	425	VJ3/*	294	J3/*	257	J3/*	436	J3/*
Nickel	mg/kg	73.3	VN*	141	N*	61.9	N *	196	N *
Potassium	mg/kg	676	VB	531	B	510	B	630	B
Silver	mg/kg	ND(1.1)	VA	ND(1.2)	A	ND(1.1)	A	ND(1.1)	A
Sodium	mg/kg	ND(394)	VU1/B	ND(334)	U1/B	ND(270)	U1/B	ND(408)	U1/B
Vanadium	mg/kg	67.1	VA	56.8	A	60.5	A	49.8	A
Zinc	mg/kg	ND(33.8)	VU1/*E	ND(31.1)	U1/*E	ND(28.1)	U1/*E	ND(31.7)	U1/*E
EPA-9045									
pH	ph	6.9	A	7.6	A	6.7	A	6.9	A

Notes:

Units expressed as milligrams (mg) of chemical per kilogram (kg) of soil.

NA: Not Analyzed.

ND(): Not Detected at a specific detection limit. Limit of detection is included in parenthesis.

Table 21  
Analytical Results for Inorganic Compounds Detected in Soil Samples  
Site PA-18  
Hunters Point Annex

Page 5

Station Number:	PA18MW08A	PA18MW08A	PA18MW09A	PA18MW09A
Sample Depth(feet):	2.75	8.75	1.75	11.75
Sample Number:	9105H585	9105H586	9105G591	9105G592
Matrix:	SOIL	SOIL	SOIL	SOIL
Sample Date:	01/31/91	01/31/91	01/30/91	01/30/91
Lab Sample Number:	73983	73984	73763	73764

Test Method/Analyte Name	Units	value	qual	value	qual	value	qual	value	qual
CLP-CVAA									
Mercury	mg/kg	ND(0.058)	J5/N*	ND(0.057)	J5/N*	0.28	N *	ND(0.054)	NW
CLP-FUAA									
Arsenic	mg/kg	1.9	B	1.3	B	3.4	A	8.6	A
Lead	mg/kg	3.3	*	4.4	*	79.7	*	27.4	*
CLP-ICP									
Aluminum	mg/kg	7470	A	9210	A	7410	*	ND(18300)	VJ2/*
Antimony	mg/kg	40.2	J3/N	43.6	J3/N	ND(23.4)	U1J3/N*	53.5	VJ3/N *
Barium	mg/kg	57.7	A	57.3	A	76.5	A	173	VA
Beryllium	mg/kg	ND(0.48)	U1/B	ND(0.37)	U1/B	ND(0.33)	U1/B	0.86	V/B
Cadmium	mg/kg	3.2	A	4.5	A	4.1	*	9.3	V/*
Calcium	mg/kg	1780	J3/*	2720	J3/*	11200	*	6.5	VJ4/B*
Chromium	mg/kg	110	N	160	N	47.5	J3/N	47.5	VJ3/N
Cobalt	mg/kg	21.4	A	33.3	A	9.3	B *	17.5	V/*
Copper	mg/kg	11.2	*	24.7	*	32.1	*	43.2	VJ2/*
Iron	mg/kg	20100	A	24800	A	14300	*	33800	V/*
Magnesium	mg/kg	3800	A	10800	A	4700	*	10000	V/*
Manganese	mg/kg	364	N	552	N	254	J3/*	542	VJ34/*
Nickel	mg/kg	200	A	601	A	39.5	N *	70.6	V/N*
Potassium	mg/kg	419	B	576	B	731	B	1870	VA
Silver	mg/kg	ND(1.2)	A	ND(1.2)	A	ND(1.1)	A	ND(1.1)	VA
Sodium	mg/kg	ND(308)	U1/B	ND(849)	U1/B	ND(850)	U1/B	ND(364)	VU1/B
Vanadium	mg/kg	46.8	A	28.4	A	35.6	A	37.8	VA
Zinc	mg/kg	29	A	ND(37.2)	U1	83.3	*E	83.3	VJ4/*E
EPA-9045									
pH	ph	7.4	A	7.8	A	7.9	A	7.8	A

Notes: Units expressed as milligrams (mg) of chemical per kilogram (kg) of soil.

NA: Not Analyzed.

ND(): Not Detected at a specific detection limit. Limit of detection is included in parenthesis.

Validation Assigned Qualifiers

- A: Data is acceptable based on a review of laboratory and field QC samples and holding times as discussed in the text.
- J2: Analytical results for this compound are qualified as estimated due to laboratory matrix duplicate quality control criteria exceedances.
- J3: Analytical results for this compound are qualified as estimated due to poor spike recoveries.
- J4: Analytical results for this compound are qualified as estimated due to ICP-serial dilution relative percent difference quality control criteria exceedances.
- J5: Analytical results for this compound are qualified as estimated due to holding time exceedances.
- J6: Analytical results for this compound are qualified as estimated due to field duplicate quality control criteria exceedances.
- R1: Analytical results for this compound are qualified as rejected due to holding time exceedances.
- R2: Analytical results for this compound are qualified as rejected due to poor spike recoveries.
- U1: Compound is qualified as non-detected due to its occurrence in the laboratory blanks.
- U2: Compound is qualified as non-detected due to its occurrence in the field blanks.
- V: Sample has undergone full CLP validation.

Laboratory Assigned Qualifiers

- B: Reported value is less than the CRDL and greater than or equal to the instrument detection limit.
- E: The serial dilution analysis did not meet the contractual requirement of  $\pm 10\%$  (SOW 7/87 E-12)
- G: Reporting limit raised due to matrix interference.
- N: Spiked sample recovery not within control limits.
- O: Reporting limit raised due to high level of analyte present in sample.
- R: Reporting limit raised due to high level of analyte present in sample.
- S: The reported value was determined by the Method of Standard Additions (MSA).
- U: Compound was analyzed but not detected.
- W: Post-digestion spike for furnace AA analysis is outside of control limits.
- \*: Duplicate analysis not within control limits.
- +: Correlation coefficient for the MSA is less than 0.995.

Table 22

Page 1

Analytical Results for Inorganic Compounds Detected in Groundwater Samples  
 Site PA-18  
 Hunters Point Annex

Station Number:	PA18MW08A	PA18MW09A	PA18MW09A
Sample Depth (feet):	0.00	0.00	0.00
Sample Number:	9107X058	9107X050	9107X051
Matrix:	H2O	H2O	H2O
Sample Date:	02/14/91	02/11/91	02/11/91
Lab Sample Number:	76631	75675	75676

Test Method/Analyte Name	Units	value	qual	value	qual	value	qual
CLP-ICP							
Barium	ug/l	ND (10)	U2/B	88.1	B	89.1	B
Calcium	ug/l	18500	E	95500	E	96300	E
Chromium	ug/l	19.9	A	ND (9)	A	ND (9)	A
Cobalt	ug/l	ND (6)	A	7.3	B	7.2	B
Magnesium	ug/l	71000	A	99400	A	101000	A
Manganese	ug/l	91.6	E	1340	E	1360	E
Nickel	ug/l	ND (14)	A	29	B	31.3	B
Potassium	ug/l	3770	B	23400	A	23700	A
Sodium	ug/l	30000	A	196000	A	199000	A
EPA-9045							
pH	ph	7.7	A	7.5	A	7.6	A

Notes: Units expressed as micrograms (ug) of chemical per liter (l) of water.

NA: Not Analyzed.

ND(): Not Detected at a specific detection limit. Limit of detection is included in parenthesis.



Validation Assigned Qualifiers

- A: Data is acceptable based on a review of laboratory and field QC samples and holding times as discussed in the text.
- J2: Analytical results for this compound are qualified as estimated due to laboratory matrix duplicate quality control criteria exceedances.
- J3: Analytical results for this compound are qualified as estimated due to poor spike recoveries.
- J4: Analytical results for this compound are qualified as estimated due to ICP-serial dilution relative percent difference quality control criteria exceedances.
- J5: Analytical results for this compound are qualified as estimated due to holding time exceedances.
- J6: Analytical results for this compound are qualified as estimated due to field duplicate quality control criteria exceedances.
- R1: Analytical results for this compound are qualified as rejected due to holding time exceedances.
- R2: Analytical results for this compound are qualified as rejected due to poor spike recoveries.
- U1: Compound is qualified as non-detected due to its occurrence in the laboratory blanks.
- U2: Compound is qualified as non-detected due to its occurrence in the field blanks.
- V: Sample has undergone full CLP validation.

Laboratory Assigned Qualifiers

- B: Reported value is less than the CRDL and greater than or equal to the instrument detection limit.
- E: The serial dilution analysis did not meet the contractual requirement of +/- 10% (SOW 7/87 E-12)
- G: Reporting limit raised due to matrix interference.
- N: Spiked sample recovery not within control limits.
- O: Reporting limit raised due to high level of analyte present in sample.
- R: Reporting limit raised due to high level of analyte present in sample.
- S: The reported value was determined by the Method of Standard Additions (MSA).
- U: Compound was analyzed but not detected.
- W: Post-digestion spike for furnace AA analysis is outside of control limits.
- \*: Duplicate analysis not within control limits.
- +: Correlation coefficient for the MSA is less than 0.995.

**Table 23. Summary of Organic Compounds  
Detected in Soil Samples  
Site PA-18  
Hunters Point Annex**

Test Method (Number of Analyses) Analyte Name	Units	Number of Detected Values	Min Value	Max Value
CLP-VOC (20)				
Carbon disulfide	µg/kg	1	7	7
Methyl ethyl ketone	µg/kg	2	23	27
Toluene	µg/kg	18	2.8	2,900
Ethyl benzene	µg/kg	1	1,200	1,200
Xylenes	µg/kg	2	3.8	9,800
CLP-SOC (20)				
2,4-Dinitrotoluene	µg/kg	1	300	300
CLP-PEST/PCB (20)				
4,4'-DDT	µg/kg	1	9.2	9.2
alpha-Chlordane	µg/kg	2	15	40
gamma-Chlordane	µg/kg	2	13	37
Aroclor-1260	µg/kg	1	78	78
TPH DIESEL (20)				
TPH-Diesel	mg/kg	10	32	5,700
TPH GAS (20)				
TPH-Gasoline	mg/kg	1	140	140
OIL & GREASE (20)				
Oil & Grease	mg/kg	18	32.8	49,600

Notes:

Units expressed as micrograms (µg) or milligrams (mg) of chemical per kilogram (kg) of soil.

Max Value = Maximum concentration detected in any soil sample analyzed for organic compounds.

Min Value = Minimum concentration detected in any soil sample analyzed for organic compounds. Minimum concentration detected may be below the reporting limit.

**Table 24. Summary of Inorganic Compounds  
Detected in Soil Samples  
Site PA-18  
Hunters Point Annex**

Test Method (Number of Analyses)		Units	Number of Detected Values	Min Value	Max Value	Estimated Upper Limit Background Concentration <sup>1</sup>
Analyte Name						
CLP-CVAA	(20)					
Mercury		mg/kg	12	0.06	3.7	--
CLP-FUAA	(20)					
Arsenic		mg/kg	15	1.3	13.9	7
Lead		mg/kg	20	0.9	409	12
CLP-ICP	(20)					
Aluminum		mg/kg	19	3,220	37,800	--
Antimony		mg/kg	18	10.7	120	--
Barium		mg/kg	20	7	288	200
Beryllium		mg/kg	5	0.19	0.97	1.0
Cadmium		mg/kg	20	2	20.4	2.1
Calcium		mg/kg	20	1.5	23,600	--
Chromium		mg/kg	17	22.3	180	1,000
Cobalt		mg/kg	19	5.6	96.6	175
Copper		mg/kg	20	8.7	229	100
Iron		mg/kg	20	23.5	65,500	55,000
Magnesium		mg/kg	20	352	129,000	--
Manganese		mg/kg	20	172	1,050	1,250
Nickel		mg/kg	20	27.7	1,070	3,000
Potassium		mg/kg	18	223	1,870	--
Silver		mg/kg	1	9.3	9.3	--
Sodium		mg/kg	1	402	402	--
Vanadium		mg/kg	20	12.2	187	90
Zinc		mg/kg	10	29	704	100
EPA-9045	(20)					
pH		pH	20	6.7	8.5	

Notes:

Units expressed as milligrams (mg) of chemical per kilogram (kg) of soil.

Max Value = Maximum concentration detected in any soil sample analyzed for inorganics.

Min Value = Minimum concentration detected in any soil sample analyzed for inorganics. Minimum concentration detected may be below the reporting limit.

1 = Calculated for serpentinite fill (HLA, 1990c).

-- = Not calculated for this metal.

**Table 25. Summary of Inorganic Compounds  
Detected in Groundwater Samples  
Site PA-18  
Hunters Point Annex**

Test Method Analyte Name	(Number of Analyses)	Units	Number of Detected Values	Min Value	Max Value	Maximum Contaminant Levels <sup>1</sup> (MCLs)
CLP-ICP	(3)					
Barium		µg/l	2	88.1	89.1	1,000
Calcium		µg/l	3	18,500	96,300	--
Chromium		µg/l	1	19.9	19.9	50
Cobalt		µg/l	2	7.2	7.3	--
Magnesium		µg/l	3	71,000	101,000	--
Manganese		µg/l	3	91.6	1,360	--
Nickel		µg/l	2	29	31.3	100
Potassium		µg/l	3	3,770	23,700	--
Sodium		µg/l	3	30,000	199,000	--
EPA-9045 pH	(3)	µg/l	2	7.5	7.7	

**Notes:**

Units expressed as micrograms (µg) of chemical per liter (l) of water.

Max Value = Maximum concentration detected in any groundwater sample analyzed for inorganics.

Min Value = Minimum concentration detected in any groundwater sample analyzed for inorganics. Minimum concentration detected may be below the reporting limit.

1 = California Primary MCLs.

-- = Not given for this metal.

Table 26. Sample Containers, Handling and Preservation Protocols  
for Groundwater and Soil Samples

Sample Matrix	Type of Analysis	Type and Size of Container	Number of Containers and Sample Volume (per sample)	Preservation	Maximum Holding Time *
Water	CLP VOCs	40 ml or 125 ml glass vial, Teflon-back septum	Two (2) or Three (3); vials filled completely, no air space	Cool to 4°C (ice in cooler)	10 days <sup>1</sup>
Water	TPH gasoline	40 ml or 125 ml glass vial, Teflon-back septum	Two (2) or Three (3); vials filled completely, no air space	Cool to 4°C (ice in cooler)	7 days
Water	CLP SOC, CLP PCBs/Pesticides	1 liter amber glass bottle with Teflon-lined cap	Two (2); bottles are filled	Cool to 4°C (ice in cooler)	Extract within 5 days; analyze within 40 days <sup>1</sup>
Water	CLP Dissolved Metals, including molybdenum	1 liter polyethylene bottle	One (1); bottle is filled	Nitric Acid to below pH of 2 (approximately 2 ml concentrated HNO <sub>3</sub> per liter after field filtering with 0.45 micron filter); cool to 4°C	6 months [26 days for mercury] <sup>1</sup>
Water	Hexavalent Chromium	250 ml polyethylene bottle	One (1); bottle is filled completely, no air space	Cool to 4°C	24 hours
Water	CLP Cyanide	1 liter polyethylene bottle	One (1); bottle is filled	NaOH to pH > 12; Cool to 4°C (ice in cooler)	12 days <sup>1</sup>
Water	TPH diesel	1 liter amber glass bottle with Teflon-lined cap	Two (2); bottles are filled	Cool to 4°C	Extract within 14 days, analyze within 40 days
Water	Oil and Grease	1 liter amber glass bottle with Teflon-lined cap	Two (2); bottles are filled	Cool to 4°C (ice in cooler) H <sub>2</sub> SO <sub>4</sub> to below pH of 2	28 days

**Table 26. Sample Containers, Handling and Preservation Protocols  
for Groundwater and Soil Samples  
(Continued)**

Sample Matrix	Type of Analysis	Type and Size of Container	Number of Containers and Sample Volume (per sample)	Preservation	Maximum Holding Time*
Soil	CLP VOCs, TPH Gasoline	Air-tight completely full brass or stainless steel 4- or 6-inch long, 2.5-inch diameter tube or acid-washed 400g mason jar	One (1)	Cool to 4°C (ice in cooler)	10 days for VOCs <sup>1</sup> 14 days for TPH
Soil	CLP SOC, CLP PCBs/ Pesticides, TPH Diesel, and Oil and Grease	Air-tight completely full brass or stainless steel 4- or 6-inch long, 2.5-inch diameter tube or acid-washed 400g mason jar	One (1)	Cool to 4°C (ice in cooler)	Extract within 10 days; analyze within 40 days <sup>1</sup>
Soil	CLP Metals, CLP Cyanide Hexavalent Chromium, pH	Acid-washed 400g mason jar or air-tight completely full brass or stainless steel 4- or 6-inch long 2.5 inch diameter tube	One (1)	Cool to 4°C (ice in cooler)	6 months, (26 days for Mercury, 12 days for cyanide) <sup>1</sup>

NA Not applicable.

<sup>1</sup> Holding time for CLP analyses calculated from the validated time of sample receipt (VTSR), the date on which a sample is received at the laboratory

**Table 27. Required Laboratory QC Samples\***

Analysis	Method Blank	Matrix Duplicate	Matrix Spike	Matrix Spike Duplicate	Blank Spike	Surrogate Spike
CLP VOCs	R <sup>1</sup>	-- <sup>2</sup>	R	R	--	R
CLP SOCs	R	--	R	R	--	R
CLP Pest./PCBs	R	--	R	R	R	R
CLP Metals	R	R	R	--	R	--
Chromium VI	R	R	R	--	R	--
CLP Cyanide	R	R	R	--	R	--
TPH, gasoline	R	--	R	R	R	--
TPH, diesel	R	--	R	R	R	--
Oil & Grease	R	R	R	--	R	--
pH	--	R	--	--	--	--

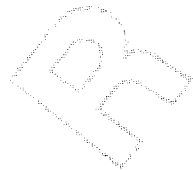
\* The sample containers, handling, and preservation protocols for laboratory QC samples are the same as those listed in Table 26. Volumes (number of containers) required for laboratory QC analyses are 2x the volumes (3x for CLP VOCs) stated in Table 26.

<sup>1</sup> R = Required; minimum frequency is 1/20 samples. However, frequency of laboratory QC samples is dependent on the frequency of submittal and analysis; see CLP SOW and NACIP manual for specifics in frequency of laboratory QC analysis.

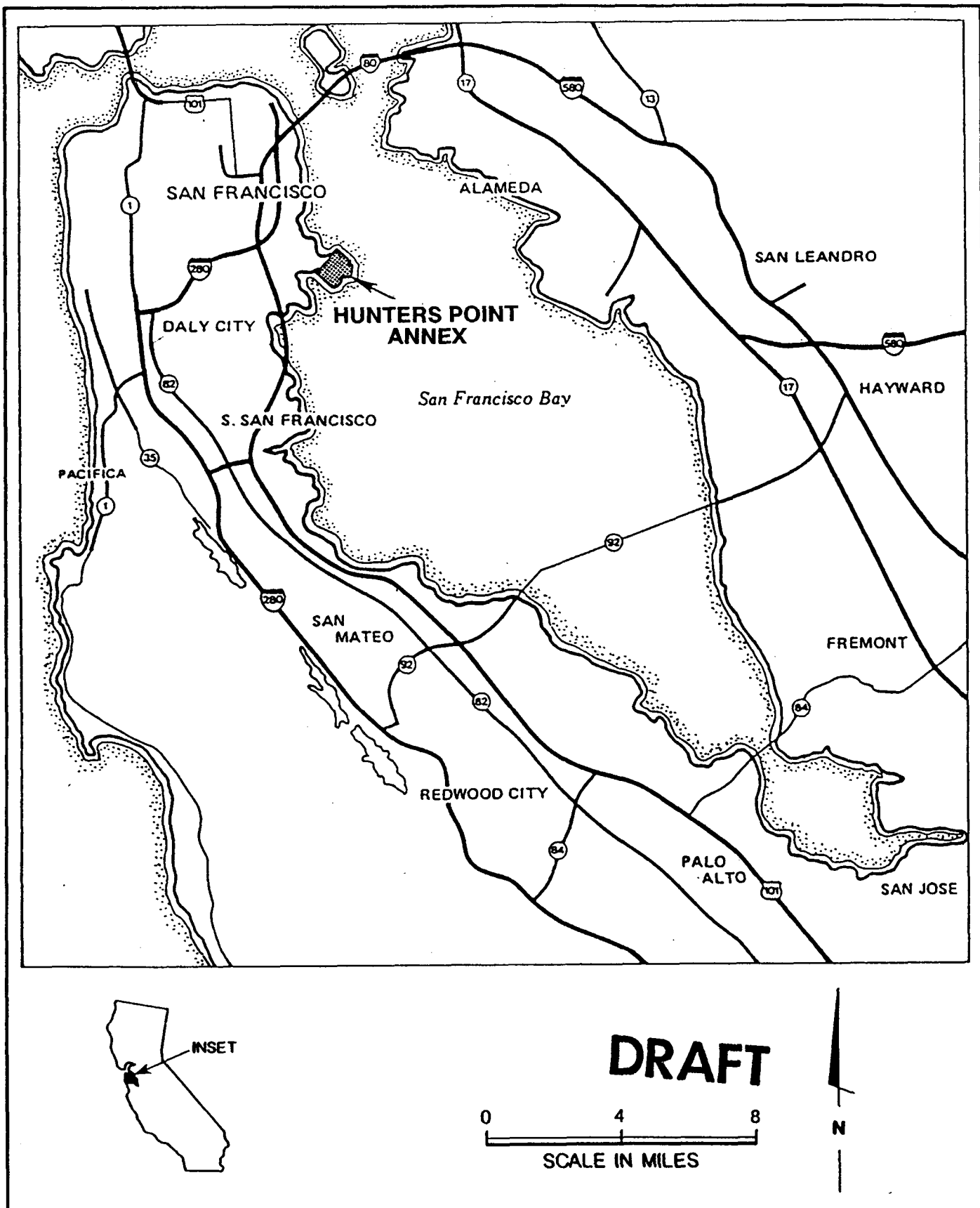
<sup>2</sup> -- = Not required.



**PLATES**







**Harding Lawson Associates**  
Engineering and  
Environmental Services

**Location Map**  
**Site Inspections: Sites PA-16 and PA-18**  
**Hunters Point Annex**  
**San Francisco, California**

PLATE

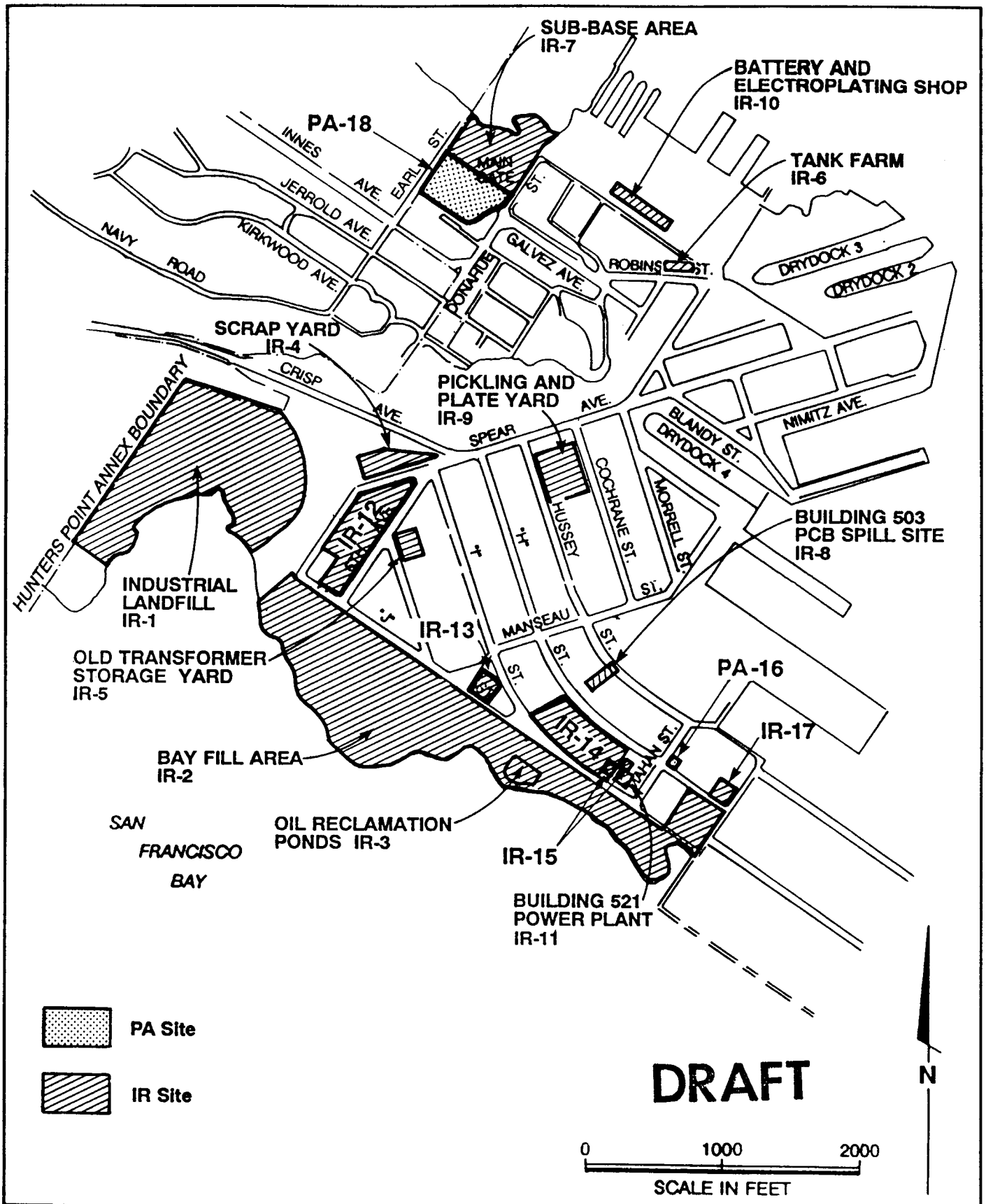
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DM 18639,519.02

APPROVED

DATE  
8/91

REVISED DATE



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Environmental Services

DRAWN  
ML

JOB NUMBER  
18639,519.02

**PA and IR Site Location Map**  
**Site Inspections: Sites PA-16 and PA-18**  
Hunters Point Annex  
San Francisco, California

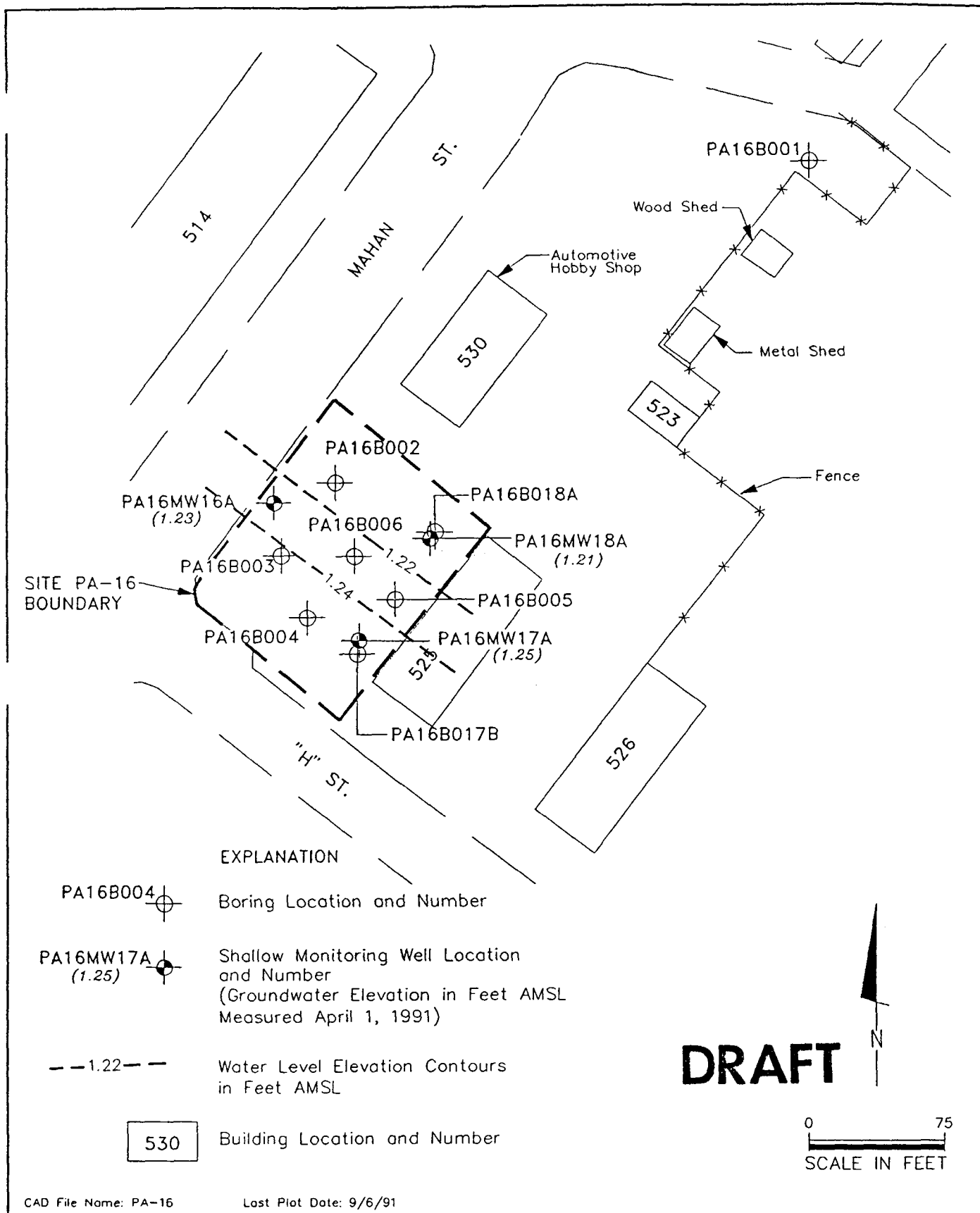
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8/91

REVISED DATE

PLATE

**2**



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Boring and Monitoring Well Locations-Site PA-16 PLATE  
Site Inspections: Sites PA-16 and PA-18  
Hunters Point Annex  
San Francisco, California

**3**

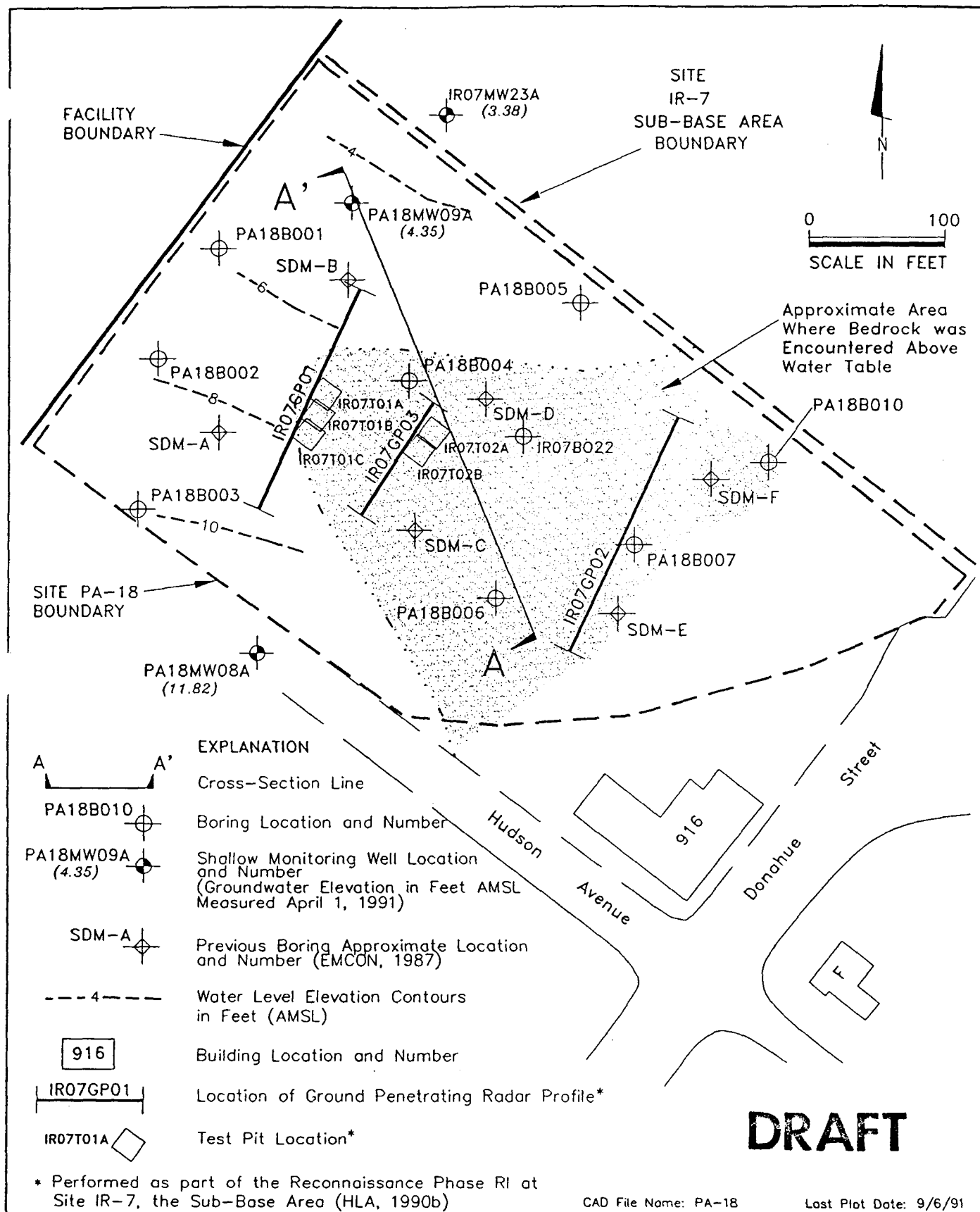
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**Boring and Monitoring Well Locations—Site PA-18** PLATE  
Site Inspections: Sites PA-16 and PA-18  
Hunters Point Annex  
San Francisco, California

**4**

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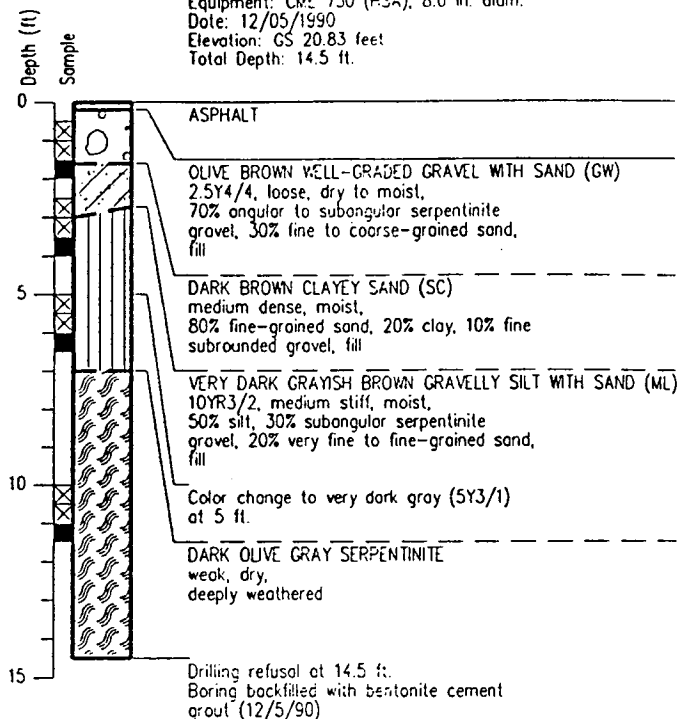
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8/91

REVISED DATE

Blows / 6"	OVA (ppm)	Sample Number
3 8 12	0	9049H562
9 12 13	2	9049H563
9 12 13	4	9049H564
5 10 8	0	9049H565



**DRAFT**



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Log of Boring: IR07B022  
Primary Phase Remedial Investigation  
Naval Station, Treasure Island, Hunters Point Annex  
San Francisco, California

PLATE

**5**

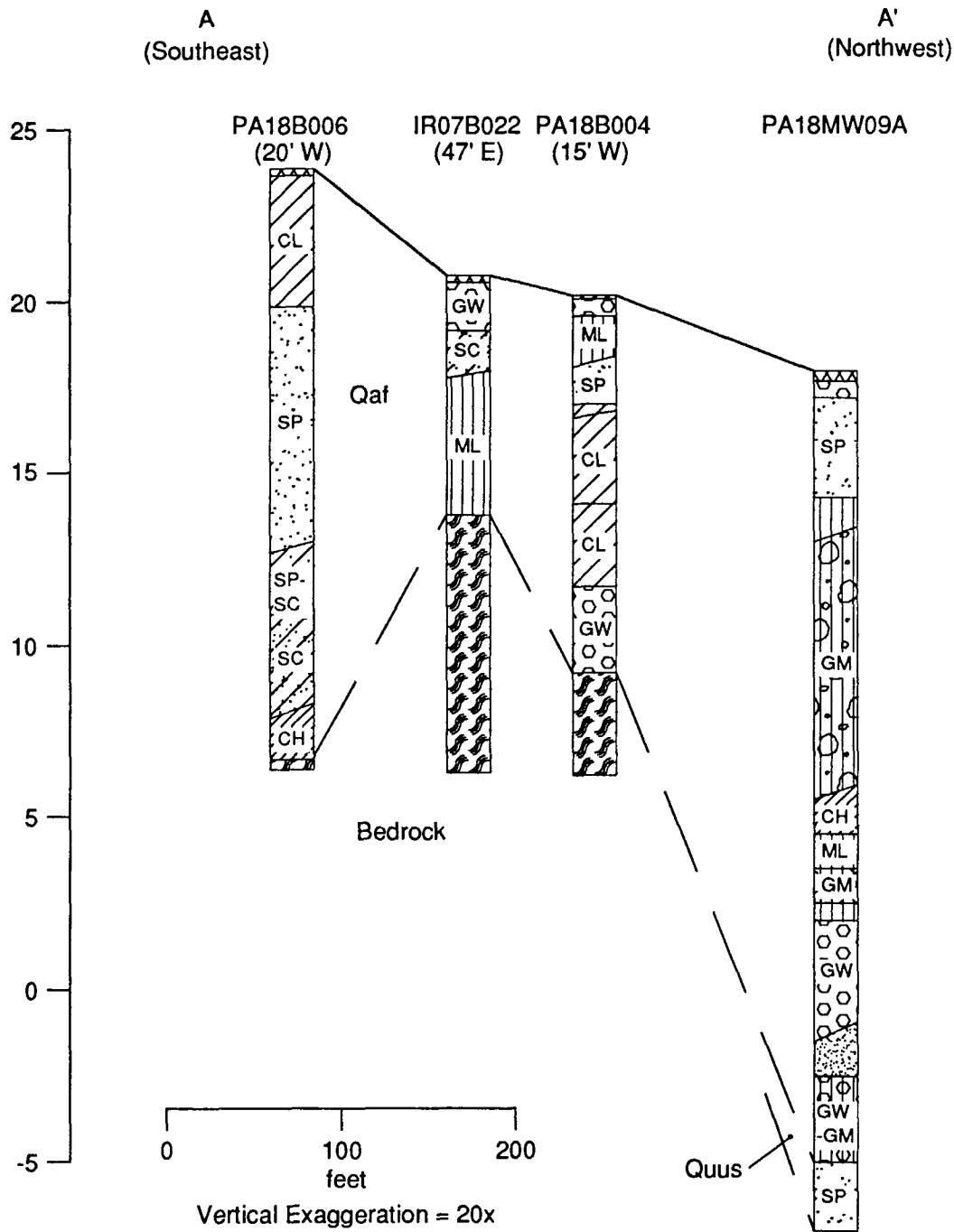
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5/91

REVISED DATE



Qaf = Bedrock-derived fill  
 Quus = Undifferentiated sedimentary deposits  
 Bedrock = Serpentine bedrock  
 Location of cross section shown on Plate 4.

**DRAFT**



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**Cross Section A-A' — Site PA-18**  
 Site Inspections: Sites PA-16 and PA-18  
 Hunters Point Annex  
 San Francisco, California

PLATE

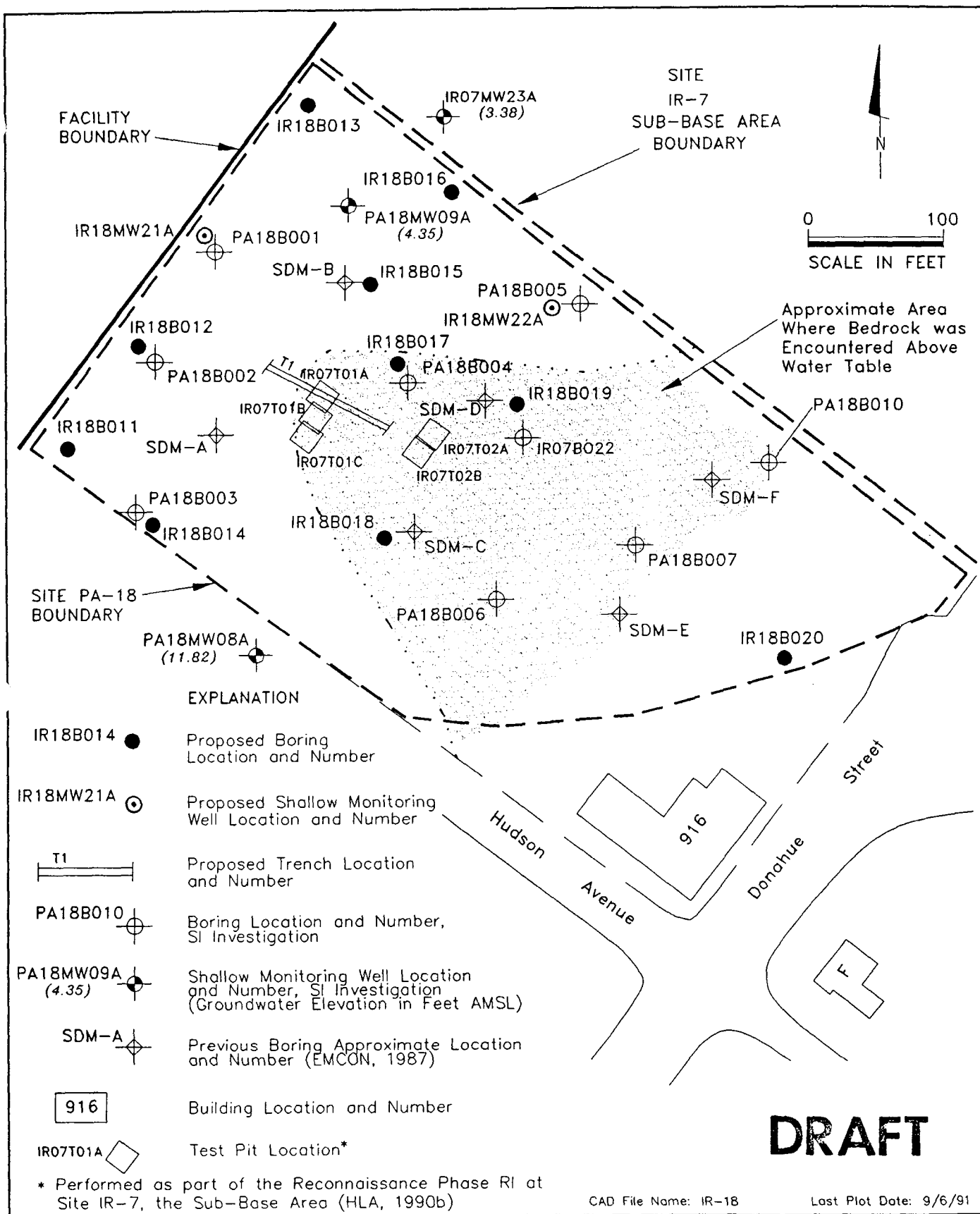
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 DLFc 18639,519.02

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DATE  
 9/91

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Proposed Boring, Monitoring Well,  
and Trench Locations—Site PA-18  
Remedial Investigation: Site PA-18  
Hunters Point Annex  
San Francisco, California

PLATE

**7**

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JOB NUMBER  
18639,519.02

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8/91

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CAD File Name: IR-18

Last Plot Date: 9/6/91

T

E

**Appendix A**

**GEOLOGIC UNITS IDENTIFIED AT HUNTERS POINT ANNEX**

A

RF

D



## APPENDIX A GEOLOGIC UNITS IDENTIFIED AT HUNTERS POINT ANNEX

The following list is a description of the geologic units that have been identified at Hunters Point Annex. These descriptions are based on visual observations and the references listed. The units presented below are used as the working standard for the entire site, subject to changes as investigations continue.

In general, the stratigraphic sequence in which these units are found, from top to bottom, is as follows: Fill (Qaf, Qaif, or Recently Imported Backfill Material); Slope debris or Ravine Fill (Qsr); Undifferentiated Upper Sands (Quus); Bay Mud Deposits (Qbm); Undifferentiated Sedimentary Deposits (Qu); Franciscan Formation (Bedrock).

### Bedrock-Derived Fill (Qaf):

Predominantly Franciscan-derived gravel- to boulder-sized materials within a sand and/or clay matrix. Serpentinite is the dominant rock type, with minor amounts of chert, greenstone, shale and graywacke. In some areas, the bedrock-derived material may be mixed with fat "bay mud" clays. The fill varies in color and size of material, and is loose to very dense. It may also include Ravine fill deposits which cannot be easily distinguished from bedrock-derived fill. The thickness ranges from 0-50 ft.

Ref: Lowney-Kaldveer, 1972  
WESTEC, 1984  
HLA, 1988  
HLA, 1990a

### Industrial Fill (Qaif):

Metal debris, processed wood fragments, bricks, concrete and sandblast wastes; oily wastes and solvents have also been reported. Household refuse and cloth may also be present in the Industrial Fill. The materials are usually incorporated in a silty sand. Gravel- and boulder-size Franciscan-derived material are often present.

Ref: WESTEC, 1984  
HLA, 1988

Recently Imported Backfill Material:

Poorly graded very fine to fine-grained sand with fine to coarse angular gravel, occasionally well-graded fine to coarse-grained sand with gravel. Brown, olive and brownish yellow in color; loose to dense. The thickness ranges from 3-6 ft.

Ref: HLA, 1990a

Undifferentiated Upper Sands (Quus):

Poorly graded very fine to medium grained sand, occasionally silty. Very dark gray to dark greenish gray and olive in color; trace to few shell fragments, very loose to medium dense. Origin is uncertain. May be from dredging operations ("Hydraulic fill"), or in some areas it may be native. Ranges in thickness from 0-60 ft.

Ref: Lowney-Kaldveer, 1972

HLA, 1990b

Bay Mud Deposits (Qbm):

Silts and clays; dark greenish gray to dark gray, soft, highly plastic with occasional peat and sand to clayey sand lenses, trace to abundant shell fragments. May have hydrogen sulfide (H<sub>2</sub>S) odor. Strength and density may be greater than expected due to consolidation which resulted from placement of fill on top of the bay mud. Thickness ranges from 0-50 ft.

Ref: Lowney-Kaldveer, 1972

WESTEC, 1984

HLA, 1988

HLA, 1990a

Undifferentiated Sedimentary Deposits (Qu):

Poorly graded sands, silty sands and gravel, interbedded with lean clay and silts which are stiff to very stiff. Greenish gray to olive and brown in color. May include sediments which correspond to the Colma Formation, and "Older Bay Mud", which is distinguished from younger bay muds by consistency (increased stiffness) and decreased moisture content. Thickness ranges from 0-220 ft.

Ref: Bonilla, 1971

Lowney-Kaldveer, 1972

HLA, 1988

Slope Debris and Ravine Fill (Qsr):

Gravelly, sandy and silty clays; locally clayey sands and gravel; yellowish orange to medium gray color. Deposits were mapped in upland areas of HPA in the 1920s.

Ref: Bonilla, 1971

HLA, 1990a

Franciscan Formation (Bedrock):

[KJs] Sandstone and shale; hard where fresh, soft where weathered or sheared. Color is medium dark gray where fresh, yellowish brown to yellowish orange where weathered.

[KJc] Chert with interbedded shale, occurring in thin to medium beds alternating with thin beds of shale, generally grayish red. Fractures are numerous in thin-bedded chert.

[KIg] Greenstone, dark gray to greenish gray where fresh; commonly grayish olive to olive gray where moderately weathered; hard where fresh, generally closely fractured.

[Sp] Serpentine, greenish gray; may contain small bodies of gabbro and diabase; soft where exposed and weathered; moderately fractured to crushed in places.

Ref: Bonilla, 1971  
Schlocker, 1974

## References:

- Bonilla, M.G., 1971. *Preliminary Geologic Map of the San Francisco South Quadrangle and Part of the Hunters Point Quadrangle, California*. United States Geological Survey Miscellaneous Field Studies Map MF-311, 1:24,000.
- Harding Lawson Associates, 1988. *Scoping Document, Remedial Investigation/Feasibility Study, Naval Station, Treasure Island, Hunters Point Annex*. March 3.
- Harding Lawson Associates, 1990a. *Reconnaissance Activities Report, Remedial Investigation/Feasibility Study, Naval Station, Treasure Island, Hunters Point Annex*. August 9.
- Harding Lawson Associates, 1990b. *Interim Report, Phase I, Primary Remedial Investigation, Building 503, PCB Spill Area (IR-8), Naval Station, Treasure Island, Hunters Point Annex, San Francisco, California*. April 3.
- Lowney-Kaldveer Associates, 1972. *Foundation Investigation, Water Pollution Abatement Facilities, Hunters Point Naval Shipyard*.
- Schlocker, J., 1974. *Geology of the San Francisco North Quadrangle, California*. Geological Survey Professional Paper 782.
- WESTEC Services, Inc., 1984. *Initial Assessment Study, Hunters Point Naval Shipyard (Disestablished), San Francisco, California*.

## Additional References:

- Blake, M.C., Jr., et al, 1974. *Preliminary Geologic Map of Marin and San Francisco Counties and Parts of Alameda, Contra Costa, and Sonoma Counties, California*. MFS Map.
- California Division of Mines and Geology, 1969. *Geologic and Engineering Aspects of San Francisco Bay Fill*. Special Report 97.
- Helley, E. J. and K.R. LaJoie, 1979. *Flatland Deposits - Their Geology and Engineering Properties and Their Importance to Comprehensive Planning, Selected Examples from the San Francisco Bay Region, California*. Geological Survey Professional Paper 943.
- Nichols, Donald R. and Nancy A. Wright, 1971. *Preliminary Map of Historic Margins of Marshland, San Francisco Bay, California*. U.S. Geological Survey Open File Report.

**Appendix B**  
**FIELD METHODS**

## APPENDIX B

### FIELD METHODS

#### Drilling Methods

Borings for the collection of soil samples only were completed to the water table using a drilling rig equipped with 11-inch outside diameter hollow-stem augers. Samples were collected continuously from the ground surface to total depth and logged according to the methods described in sections 7.2 and 6.2 of the QAPjP, (HLA, 1988a) respectively. Upon completion of sampling, the borings were backfilled with cement/bentonite grout as described in Section 6.3 of the QAPjP.

#### Well Installation

Borings for the installation of monitoring wells were drilled to a depth of approximately 10 feet below the water table. Drilling and sampling were conducted according to the procedures described above with the exception that continuous soil sampling below the water table was not performed. Well construction details and field parameters measured during monitoring well sampling at Site PA-16 are presented in Tables 3 and 4, respectively; at Site PA-18, these results are presented in Tables 18 and 19, respectively.

Monitoring wells were installed using the methods described in Section 6.5.1 of the QAPjP. Schedule 40 PVC well casing was used to construct the wells. The screen slot size was 0.02 inch; selection of this slot size was based on sieve analysis of 34 soil samples from 17 borings throughout the HPA site as reported in the Reconnaissance Activities Report (HLA, 1990b). Screened intervals extend from the bottom of the borings to approximately 2 to 3 feet above the water table. The wells were completed below grade with a christy box and locking well cover.

#### Soil Sampling

Subsurface soil samples were collected from each boring using an 18-inch long modified California split-barrel sampler lined with three 6-inch stainless-steel tubes, as described in Section 7.2 of the QAPjP (HLA, 1988a).

The soil samples were screened for contamination in the field by placing a soil sample in a sealed glass jar, and allowing it to equilibrate for 15 minutes; the concentration of volatile organic compounds (VOCs) was then measured using an organic vapor analyzer (OVA).

One shallow soil sample and one deeper soil sample were selected for chemical analysis on the basis of visual observations and the results of field OVA screening. The deeper

soil sample having the highest OVA reading was generally collected for analysis. If none of the samples had visual indications of contamination and all the OVA readings were zero, then a deeper soil sample was selected at random and sent to the laboratory for analysis.

All soil samples analyzed were sealed with Teflon-lined plastic caps secured to ends of the stainless steel sample tubes with electrical tape. All soil samples were place in plastic ziplock bags and stored on ice until delivery to the analytical laboratory accompanied by completed chain of custody forms.

### Well Development

Wells were developed by purging using centrifugal pumps and/or a stainless-steel bailer. A vented surge block was also used in conjunction with purging and bailing. To adequately develop each well, a minimum of 10 well volumes was planned to be purged and bailed from each well. The adequacy of well development was determined by site geologists, field observations and/or when the field parameters measured during development had sufficiently stabilized (HLA, 1988a). The field parameters measured were turbidity, pH, temperature, and conductivity.

At Site PA-16, to adequately develop each well, more than 10 well volumes were purged. At PA-18, Wells PA18MW08 and PA18MW09 went dry when pumped or bailed; an estimated 6.2 and 4.6 well volumes, respectively, were purged from the wells. The wells were pumped or bailed dry 3 to 4 times over a period of 2 to 3 days. Based on field observations, the wells at PA-18 were adequately developed.

### Groundwater Sampling

Monitoring wells at each site were purged with a 4-inch PVC bailer prior to sampling. The water-level elevation of each well was measured and the purge volume calculated prior to purging.

At Site PA-16, three casing volumes were purged from each well. At Site PA-18, the wells were bailed dry and only two casing volumes were purged from the wells. Indicator parameters (temperature, conductivity, pH, and turbidity) were recorded during purging to verify complete purging of the static water in the well. A field alkalinity titration was also performed on groundwater from each well.

A 1.7-inch stainless steel bailer was used to collect groundwater samples from the wells; the samples were poured directly from the bailer to the sample containers. For the wells purged dry at Site PA-18, samples were collected after the wells had recovered to within 80 percent of the water level above the bottom of the well measured prior to purging.

Groundwater samples collected for metals analysis were filtered with a 0.45-micron filter and preserved in nitric acid (HNO<sub>3</sub>). Groundwater samples collected for VOCs were preserved with hydrochloric acid (HCl). Groundwater samples collected for

cyanide and oil and grease analyses were preserved with sodium hydroxide (NaOH) and sulfuric acid (H<sub>2</sub>SO<sub>4</sub>), respectively.

### **Decontamination**

Standard decontamination procedures were followed for all phases of field work in accordance with Section 10.1 of the QAPjP (HLA, 1988a). All drilling and soil sampling equipment in contact with soil and/or groundwater was steam cleaned prior to drilling each boring and well. All well construction materials (casing, etc.) were also steam cleaned prior to well installation. Well development pumps and bailers used for well development and sampling were steam cleaned and/or washed with an Alconox and water solution and rinsed with deionized water prior to use at each well. Water-level measurement steel tapes and electronic sounders were steam cleaned and/or washed with an Alconox and water solution and rinsed with deionized water prior to use at each well.

### **Surveying**

Surveying was performed by Land Data Services, a California-licensed surveying contractor. The elevations were measured to an accuracy of  $\pm 0.01$  foot for wells and  $\pm 0.1$  foot for borings using a mean sea level (MSL) datum. The horizontal location of both wells and borings was referenced to the California Coordinate System and is measured to an accuracy of  $\pm 1$  foot.



**Appendix C**

**BORING LOGS AND WELL  
COMPLETION DETAILS**

## APPENDIX C

### List of Plates

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#### Site PA-16

PLATE	C1	Soil Classification Chart
	C2	Log of Boring PA16B001
	C3	Log of Boring PA16B002
	C4	Log of Boring PA16B003
	C5	Log of Boring PA16B004
	C6	Log of Boring PA16B005
	C7	Log of Boring PA16B006
	C8	Log of Boring and Well Completion Detail: PA16MW16A
	C9	Log of Boring PA16B017B
	C10	Log of Boring and Well Completion Detail: PA16MW17A
	C11	Log of Boring PA16B018A
	C12	Log of Boring and Well Completion Detail: PA16MW18A

#### Site PA-18

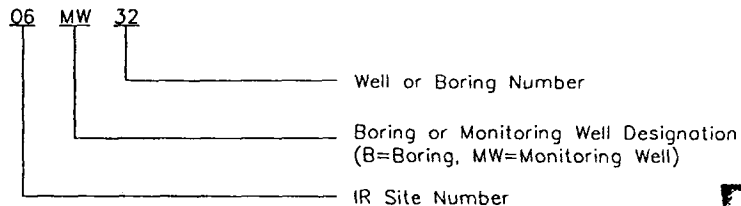
PLATE	C13	Log of Boring PA18B001
	C14	Log of Boring PA18B002
	C15	Log of Boring PA18B003
	C16	Log of Boring PA18B004
	C17	Log of Boring PA18B005
	C18	Log of Boring PA18B006
	C19	Log of Boring PA18B007
	C20	Log of Boring and Well Completion Detail: PA16MW08A
	C21	Log of Boring and Well Completion Detail: PA16MW09A
	C22	Log of Boring PA18B010

**BORING LOGS AND WELL  
COMPLETION DETAILS**

**SITE PA-16**

MAJOR DIVISIONS					TYPICAL NAMES
COARSE-GRAINED SOILS MORE THAN HALF IS COARSER THAN No. 200 SIEVE	GRAVELS  MORE THAN HALF COARSE FRACTION IS LARGER THAN No. 4 SIEVE	CLEAN GRAVELS WITH < 5% FINES	GW		WELL GRADED GRAVELS WITH OR WITHOUT SAND, LITTLE OR NO FINES
			GP		POORLY GRADED GRAVELS WITH OR WITHOUT SAND, LITTLE OR NO FINES
		GRAVELS WITH 5-15% FINES	GW-GC		WELL GRADED GRAVELS WITH CLAY, WITH OR WITHOUT SAND
			GP-GC		POORLY GRADED GRAVELS WITH CLAY, WITH OR WITHOUT SAND
			GW-GM		WELL GRADED GRAVELS WITH SILT, WITH OR WITHOUT SAND
			GP-GM		POORLY GRADED GRAVELS WITH SILT, WITH OR WITHOUT SAND
		GRAVELS WITH OVER 15% FINES	GC		CLAYEY GRAVELS WITH OR WITHOUT SAND
			GM		SILTY GRAVELS WITH OR WITHOUT SAND
	SANDS  MORE THAN HALF COARSE FRACTION IS SMALLER THAN No. 4 SIEVE	CLEAN SANDS WITH < 5% FINES	SW		WELL GRADED SANDS WITH OR WITHOUT GRAVEL, LITTLE OR NO FINES
			SP		POORLY GRADED SANDS WITH OR WITHOUT GRAVEL, LITTLE OR NO FINES
		SANDS WITH 5-15% FINES	SW-SC		WELL GRADED SANDS WITH CLAY, WITH OR WITHOUT GRAVEL
			SP-SC		POORLY GRADED SANDS WITH CLAY, WITH OR WITHOUT GRAVEL
			SW-SM		WELL GRADED SANDS WITH SILT, WITH OR WITHOUT GRAVEL
			SP-SM		POORLY GRADED SANDS WITH SILT, WITH OR WITHOUT GRAVEL
		SANDS WITH OVER 15% FINES	SC		CLAYEY SANDS WITH OR WITHOUT GRAVEL
			SM		SILTY SANDS WITH OR WITHOUT GRAVEL
FINE-GRAINED SOILS MORE THAN HALF IS FINER THAN No. 200 SIEVE	SILTS AND CLAYS  LIQUID LIMIT 50% OR LESS		CL		INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, CLAYS WITH SAND AND GRAVEL, LEAN CLAYS
			ML		INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTS WITH SAND AND GRAVEL
			OL		ORGANIC SILTS OR CLAYS OF LOW PLASTICITY
	(Borderline classification used to indicate the soil does not have field identifiable properties that place the soil in a specific group.)		ML/CL		INORGANIC CLAYEY SILTS, WITH OR WITHOUT SAND AND GRAVEL
			CL/ML		INORGANIC SILTY CLAYS OF LOW TO MEDIUM PLASTICITY, WITH OR WITHOUT SAND AND GRAVEL
			MH/CH		INORGANIC ELASTIC CLAYEY SILTS, WITH OR WITHOUT SAND AND GRAVEL
			CH/MH		INORGANIC SILTY CLAYS OF HIGH PLASTICITY, WITH OR WITHOUT SAND AND GRAVEL
	SILTS AND CLAYS  LIQUID LIMIT GREATER THAN 50%		CH		INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
			MH		INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SANDY OR SILTY SOILS, ELASTIC SILTS
			OH		ORGANIC SILTS OR CLAYS OF MEDIUM TO HIGH PLASTICITY
Pt				PEAT AND OTHER HIGHLY ORGANIC SOILS	
OTHER	BOULDERS > 50%		BF		BOULDER FILL WITH OR WITHOUT GRAVEL, SAND, AND FINES
	SERPENTINITE BEDROCK		sp		SERPENTINITE BEDROCK

## KEY TO BOREHOLE NUMBERING SYSTEM

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Harding Lawson Associates  
Engineering and  
Environmental Services

Soil Classification Chart  
Sites PA-16 and PA-18  
Primary Phase Remedial Investigation  
Hunters Point Annex  
San Francisco, California

PLATE

**C1**

DRAWN  
BEH

JOB NUMBER  
18639,519.02

APPROVED

DATE  
6/91

REVISED DATE

Blows / 6"	OVA (ppm)	Sample Number
3		
5		
7	0	9106G605
3		
5		
8		
2		
5	0	9106G606
3		
4	0	
5		
2		
3		
5	0	

Depth (ft)

Sample

0

5

Log of Boring: PA16B001  
 Equipment: MOBILE B-53 (HSA), 9.0 in. diam.  
 Date: 02/07/1991  
 Elevation: GS 7.90 feet  
 Total Depth: 8.0 ft.

DARK REDDISH BROWN SILTY GRAVEL WITH SAND (GM)  
 5YR3/3, medium dense, moist,  
 60-65% fine to coarse angular gravel, 15-20%  
 silt, 15-20% sand, trace rootlets, fill

PALE OLIVE POORLY GRADED SAND (SP)  
 5Y6/4, loose, moist,  
 90-95% fine to medium-grained sand, trace  
 fine gravel, fill  
 Trace shell fragments at 3 ft.

Color change to olive (5Y5/4) at 4 ft.

Sand with gravel lens from 5.8 to 6.1 ft.

Color change to olive (5Y4/3), wet at  
 at 6.5 ft.

Bottom of boring at 8 ft., boring backfilled  
 with bentonite cement grout (2/7/91)

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 Engineering and  
 Environmental Services

Log of Boring: PA16B001  
 Site Inspection - PA-16  
 Naval Station, Treasure Island, Hunters Point Annex  
 San Francisco, California

PLATE

**C2**

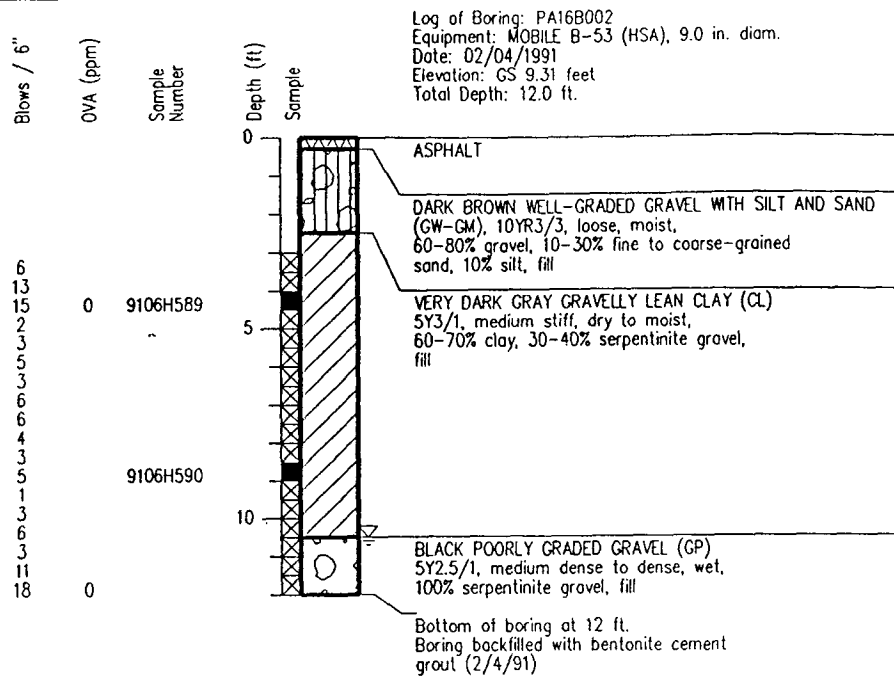
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JOB NUMBER  
 18639,519.02

APPROVED

DATE  
 8/91

REVISED DATE



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 Engineering and  
 Environmental Services

Log of Boring: PA16B002  
 Site Inspection - PA-16  
 Naval Station, Treasure Island, Hunters Point Annex  
 San Francisco, California

PLATE

**C3**

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JOB NUMBER  
 18639.519.02

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DATE  
 8/91

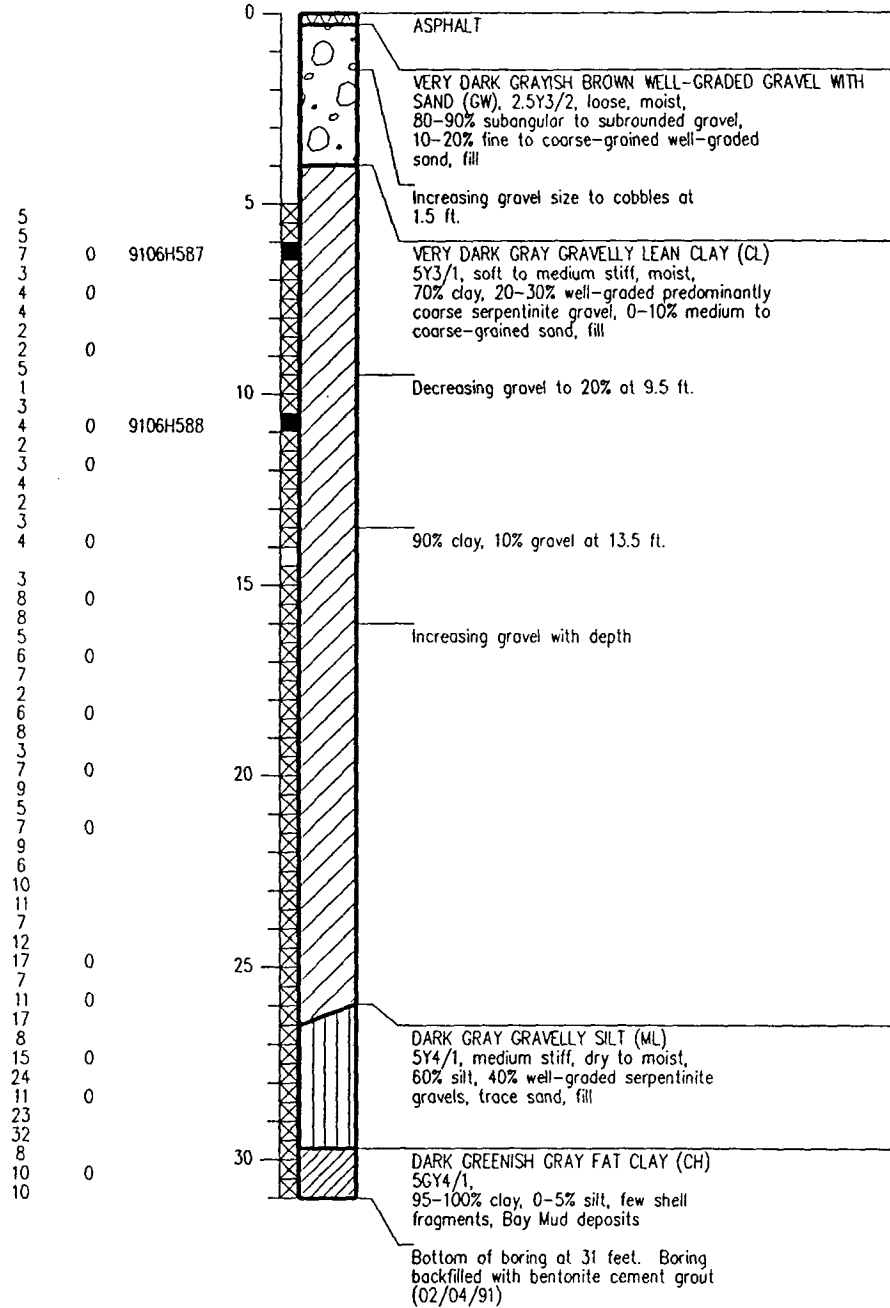
REVISED DATE

Blows / 6"

OVA (ppm)

Sample  
NumberDepth (ft)  
Sample

Log of Boring: PA16B003  
 Equipment: MOBILE B-53 (HSA), 9.0 in. diam.  
 Date: 02/04/1991  
 Elevation: GS 9.57 feet  
 Total Depth: 31.0 ft.

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 Environmental Services

Log of Boring: PA16B003  
 Site Inspection - PA-16  
 Naval Station, Treasure Island, Hunters Point Annex  
 San Francisco, California

PLATE

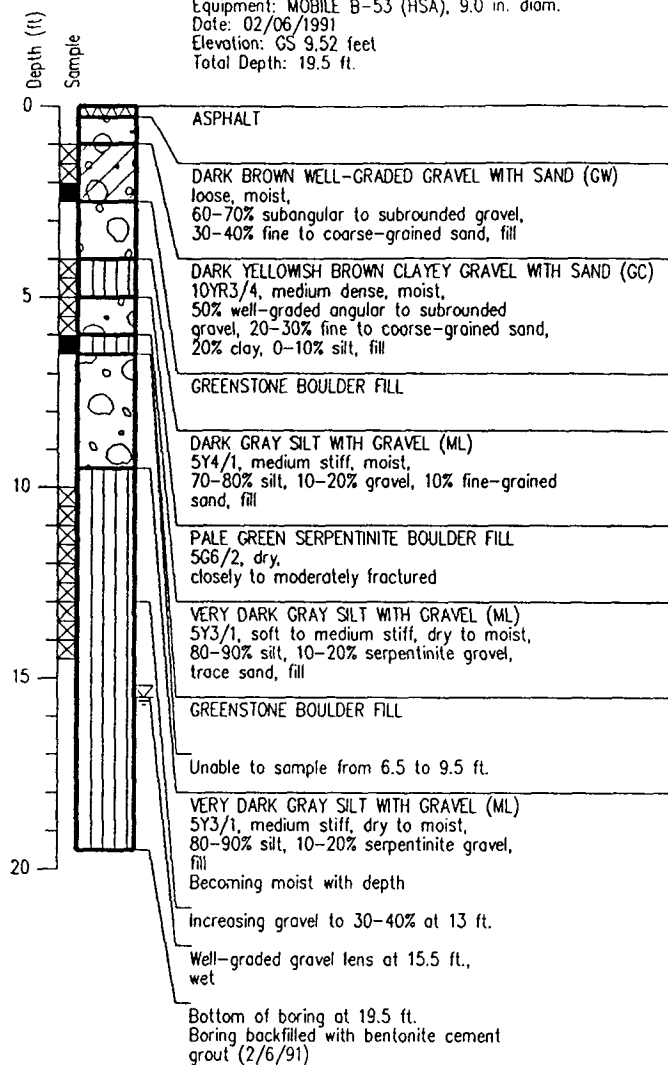
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APPROVED

DATE  
8/91

REVISED DATE

Blows / 6"	OVA (ppm)	Sample Number
8		
32		
37	0	9106H595
6		
26	0	
6		
36	0	9106H596
18		
4		
5		
8	0	
5		
7		
8		
7		
10		
10		



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 Environmental Services

Log of Boring: PA16B004  
 Site Inspection - PA-16  
 Naval Station, Treasure Island, Hunters Point Annex  
 San Francisco, California

PLATE

**C5**

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JOB NUMBER  
 18639,519.02

APPROVED

DATE  
 8/91

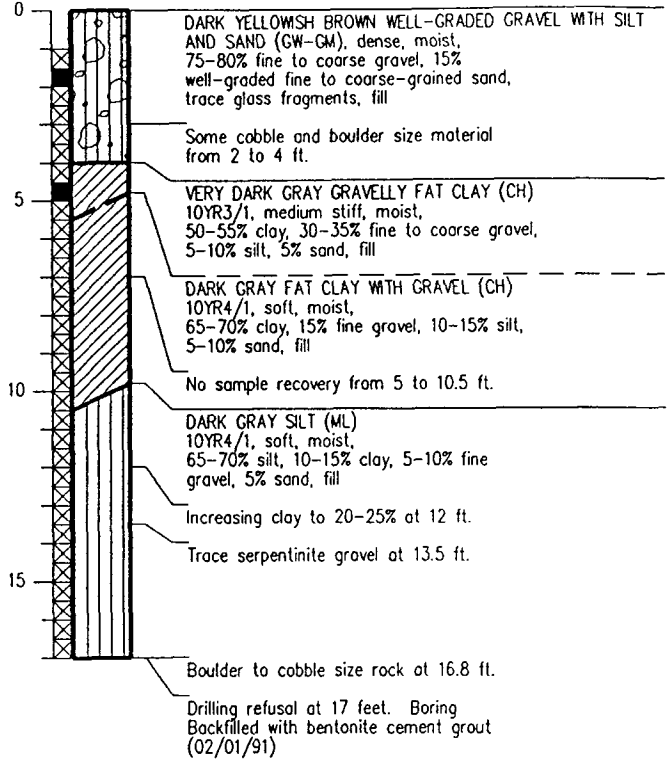
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Blows / 6"	OVA (ppm)	Sample Number
27		
50	0	9105G599
6		
19	0	
23		
15		
19	0	9105G600
20		
15		
17		
12		
6		
7		
8		
4		
7		
11		
5		
6	2	
2	0	
6		
10		
5	1	
8		
9		
5		
8		
10	1	
5		
9	1	
12		
50	0	

Depth (ft)  
Sample

Log of Boring: PA16B005  
Equipment: MOBILE B-53 (HSA), 9.0 in. diam.  
Date: 02/01/1991  
Elevation: GS 8.75 feet  
Total Depth: 17.0 ft.



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Environmental Services

Log of Boring: PA16B005  
Site Inspection - PA-16  
Naval Station, Treasure Island, Hunters Point Annex  
San Francisco, California

PLATE

**C6**

DRAWN  
GDT

JOB NUMBER  
18639,519.02

APPROVED

DATE  
8/91

REVISED DATE

Log of Boring: PA16B006  
 Equipment: MOBILE B-53 (HSA), 9.0 in. diam.  
 Date: 02/06/1991  
 Elevation: GS 9.33 feet  
 Total Depth: 12.5 ft.

Blows / 6"	OVA (ppm)	Sample Number
3		
16		
31	0	9106H593
16		
24		
15	0	
4		
10	0	
12		
3		
6		
7	0	9106H594
5		
5	0	
5		
2		
3		
5	0	
2		
5		
7		
4		
8		
20		

Depth (ft)  
 0  
 5  
 10

ASPHALT

VERY DARK GRAYISH BROWN WELL-GRADED GRAVEL WITH SAND (GW), 10YR3/2, loose, moist, 60-70% subangular to subrounded gravel, 30-40% fine to coarse-grained sand, fill

DARK BROWN SILTY GRAVEL WITH SAND (GM) 10YR3/3, medium dense, moist, 60% well-graded subangular to subrounded gravel, 25% fine to coarse-grained sand, 15% silt, fill

DARK OLIVE GRAY GRAVELLY LEAN CLAY (CL) 5Y3/2, medium stiff, moist, 60-70% clay, 30-40% subangular to subrounded predominantly serpentinite gravel, 0-10% fine to medium-grained sand, fill

DARK OLIVE GRAY GRAVELLY SILT (ML) 5Y3/2, medium stiff, dry to moist, 60-70% silt, 30-40% well-graded predominantly serpentinite gravel, trace sand, fill

DARK OLIVE GRAY SILT WITH GRAVEL (ML) soft, moist, 80-90% silt, 10-20% predominantly serpentinite gravel, fill

BLACK WELL-GRADED GRAVEL (GW) 5Y2.5/1, medium dense, dry, 100% serpentinite gravel, fill

VERY DARK GRAY SILT WITH GRAVEL (ML) 5Y3/1, soft, moist, 80-90% silt, 10-20% serpentinite gravel, fill

DARK OLIVE GRAY SILTY GRAVEL WITH SAND (GM) 5Y3/2, loose, wet, 50% poorly-graded fine gravel, 35% sand, 15% silt, fill

Bottom of boring at 12.5 ft.  
 Boring backfilled with bentonite cement grout (2/6/91)

**DRAFT**



Harding Lawson Associates  
 Engineering and  
 Environmental Services

Log of Boring: PA16B006  
 Site Inspection - PA-16  
 Naval Station, Treasure Island, Hunters Point Annex  
 San Francisco, California

PLATE

**C7**

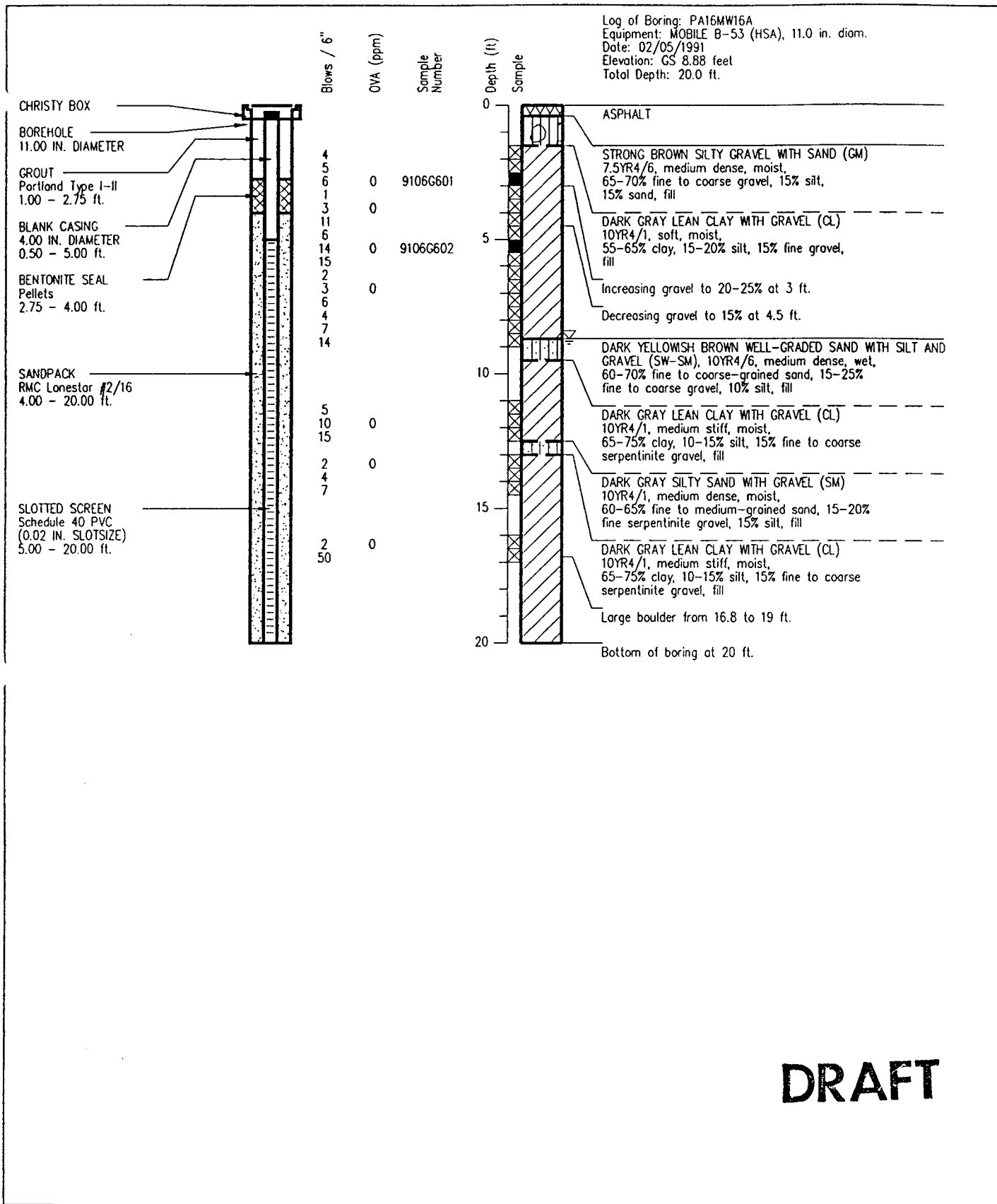
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JOB NUMBER  
 18639,519.02

APPROVED

DATE  
 8/91

REVISED DATE



**DRAFT**



Harding Lawson Associates  
 Engineering and  
 Environmental Services

Log of Boring and Well Completion Detail: PA16MW16A  
 Site Inspection - PA-16  
 Naval Station, Treasure Island, Hunters Point Annex  
 San Francisco, California

PLATE

**C8**

DRAWN  
 GDT

JOB NUMBER  
 18639,519.02

APPROVED

DATE  
 9/91

REVISED DATE

Blows / 6"	OVA (ppm)	Sample Number
6	0	9106G603
8		
10		
4	0	
5		
7	0	
3		
4	0	
8		
7		
10	0	9106G604
13		

Depth (ft)  
Sample

Log of Boring: PA16B017B  
Equipment: MOBILE B-53 (HSA), 11.0 in. diam.  
Date: 02/05/1991  
Elevation: GS 8.78 feet  
Total Depth: 6.5 ft.

DARK YELLOWISH BROWN SILTY GRAVEL WITH SAND (GM)  
10YR3/6, medium dense, moist,  
60-70% fine to coarse gravel, 15-20% sand,  
15% silt, fill

DARK YELLOWISH BROWN FAT CLAY (CH)  
10YR4/6, soft, moist,  
85-90% clay, trace silt and glass fragments, fill

Dark greenish gray (5BG4/1) mottling  
at 2.3 ft.

10-20% shell fragments at 3.5 ft.

LIGHT YELLOWISH BROWN POORLY GRADED SAND (SP)  
2.5Y6/4, loose, moist,  
80-85% fine to medium-grained sand, 10-15%  
shell fragments, fill

Greenstone boulder resulting in drilling  
refusal at 6.5 feet. Boring backfilled  
with bentonite cement grout (2/5/91)

**DRAFT**



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Engineering and  
Environmental Services

Log of Boring: PA16B017B  
Site Inspection - PA-16  
Naval Station, Treasure Island, Hunters Point Annex  
San Francisco, California

PLATE

**C9**

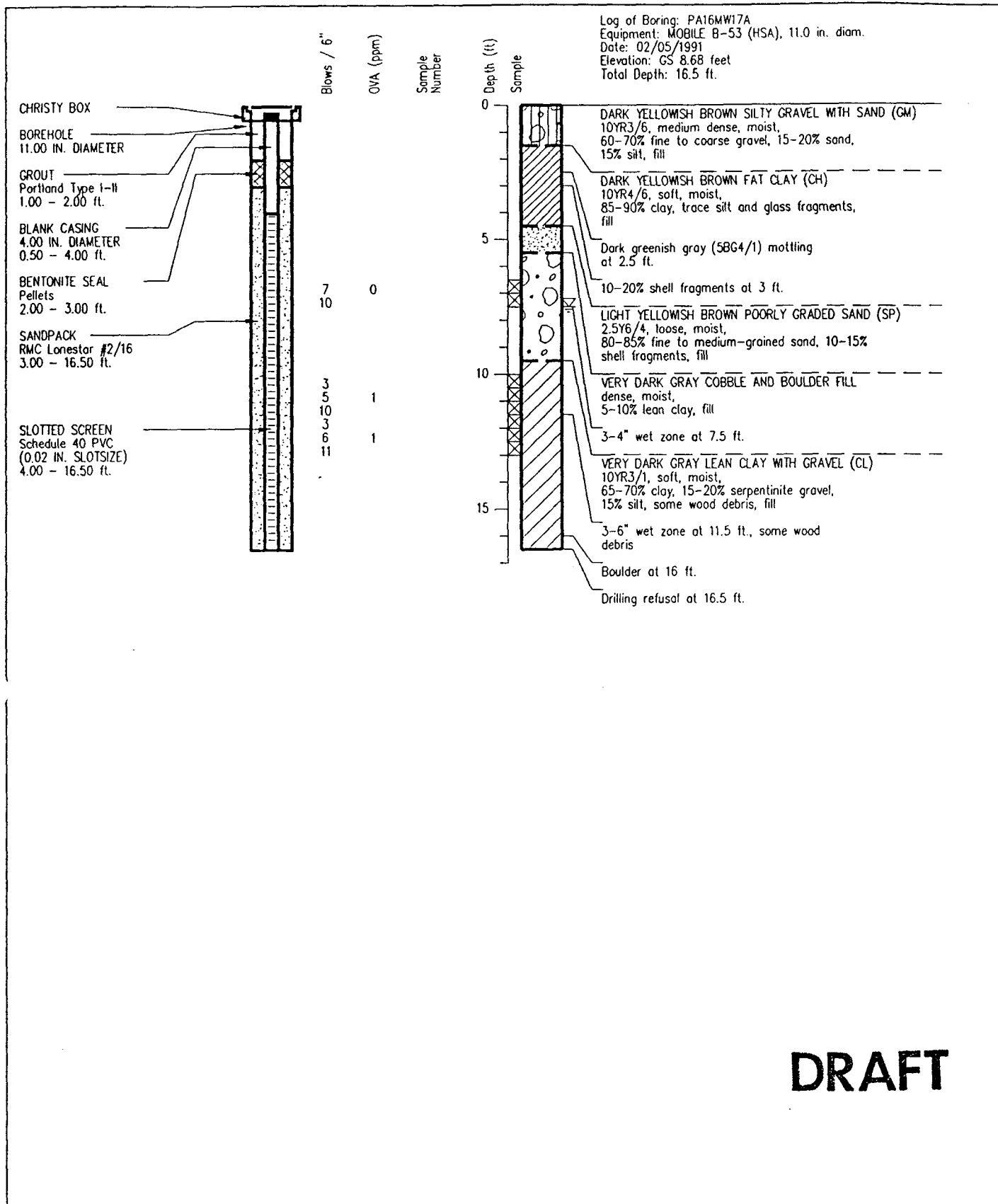
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JOB NUMBER  
18639,519.02

APPROVED

DATE  
8/91

REVISED DATE



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Blows / 6"	QVA (ppm)	Sample Number
18	0	9106H591
50	0	
18	0	
48	0	
20	0	
15	0	
14	0	
3	0	
5	0	
4	0	

Depth (ft)  
Sample

Log of Boring: PA16B018A  
Equipment: MOBILE B-53 (HSA), 11.0 in. diam.  
Date: 02/06/1991  
Elevation: GS 8.86 feet  
Total Depth: 7.0 ft.

DARK BROWN WELL-GRADED GRAVEL WITH SAND (GW)  
10YR3/3, loose to medium dense, moist,  
60-70% angular to subrounded gravel, 30-40%  
fine to coarse-grained sand, 0-5% silt, fill

DARK YELLOWISH BROWN SILTY GRAVEL WITH SAND (GM)  
10YR4/8, medium dense to dense, moist,  
60-70% well-graded angular to subrounded  
gravel, 30-35% silt, 0-5% sand, fill

Color change to dark yellowish brown  
(10YR4/6) at 2.5 ft.

Color change to yellowish brown  
(10YR5/8) at 3.5 ft., decreasing gravel to  
50-60%, increasing sand to 20-30%

VERY DARK GRAY SILT WITH GRAVEL (ML)  
5Y3/1, soft to medium stiff, dry to moist,  
85% silt, 15% poorly graded serpentinite  
gravel, fill

Boulder at 6.5 ft.

Drilling refusal at 7 ft.  
Boring backfilled with bentonite cement  
grout (2/6/91)

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Harding Lawson Associates  
Engineering and  
Environmental Services

Log of Boring: PA16B018A  
Site Inspection - PA-16  
Naval Station, Treasure Island, Hunters Point Annex  
San Francisco, California

PLATE

**C11**

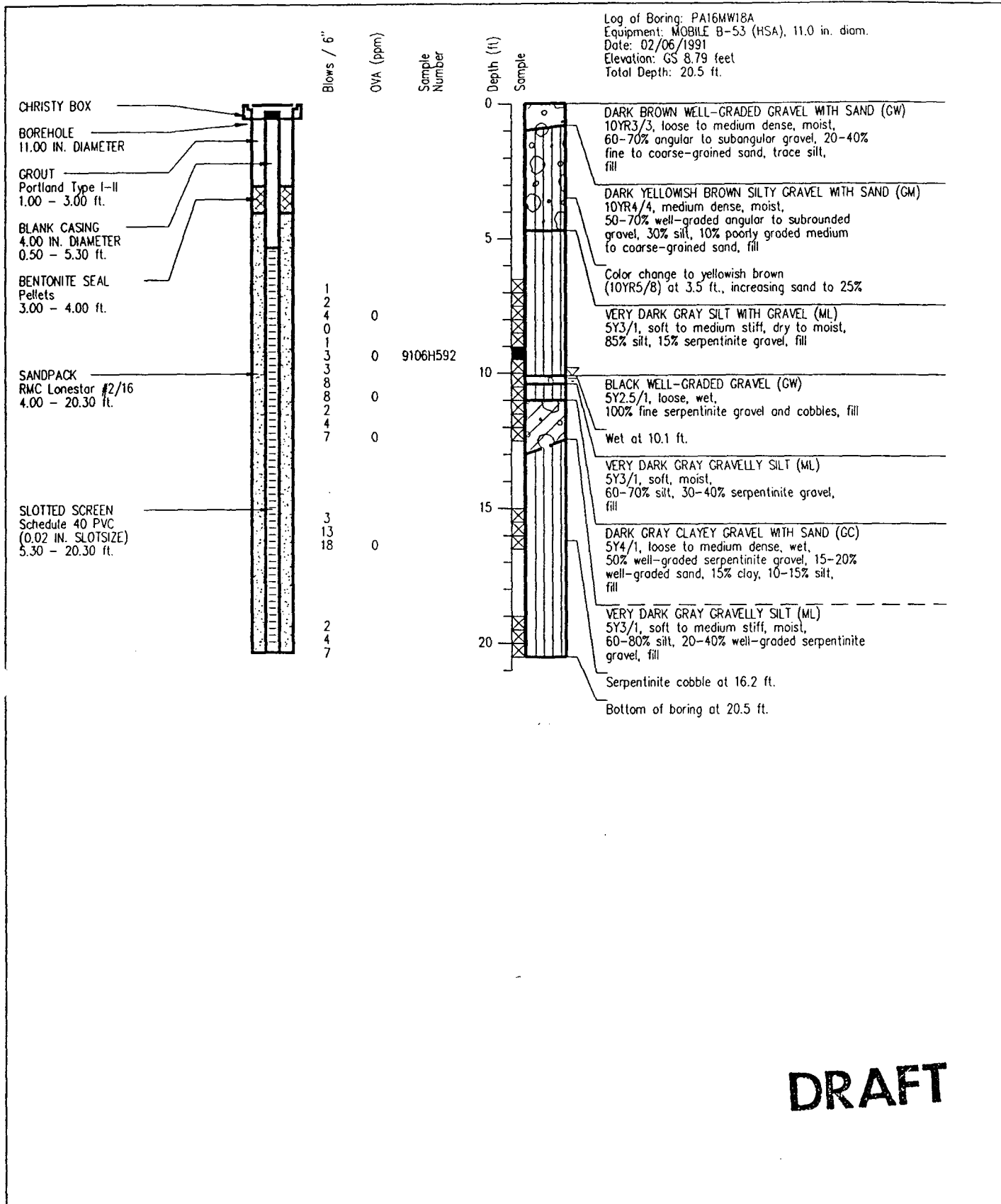
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JOB NUMBER  
18639,519.02

APPROVED

DATE  
8/91

REVISED DATE



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 Engineering and  
 Environmental Services

Log of Boring and Well Completion Detail: PA16MW18A  
 Site Inspection - PA-16  
 Naval Station, Treasure Island, Hunters Point Annex  
 San Francisco, California

PLATE

**C12**

DRAWN  
GDT

JOB NUMBER  
18639,519.02

APPROVED

DATE  
9/91

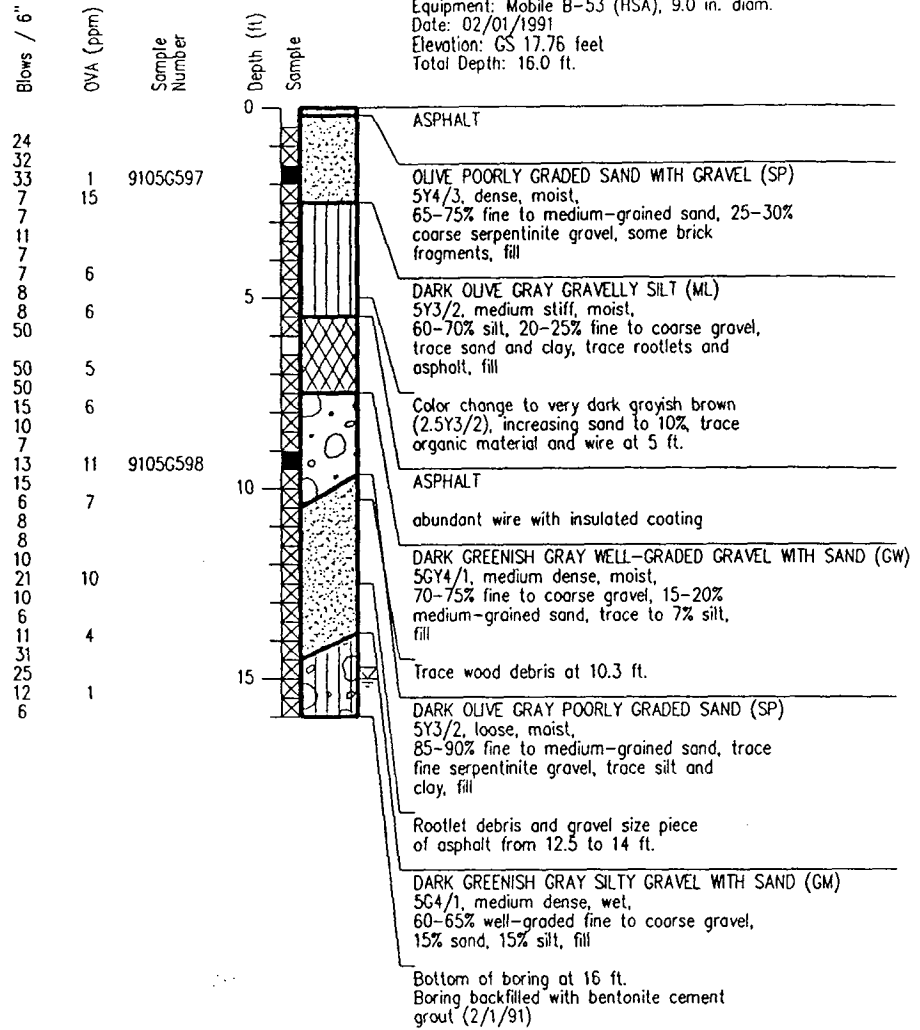
REVISED DATE

**BORING LOGS AND WELL  
COMPLETION DETAILS**

**SITE PA-18**



Log of Boring: PA18B001  
 Equipment: Mobile B-53 (HSA), 9.0 in. diam.  
 Date: 02/01/1991  
 Elevation: GS 17.76 feet  
 Total Depth: 16.0 ft.



**DRAFT**



Harding Lawson Associates  
 Engineering and  
 Environmental Services

Log of Boring: PA18B001  
 Site Inspection - PA-18  
 Naval Station, Treasure Island, Hunters Point Annex  
 San Francisco, California

PLATE

**C13**

DRAWN  
 GDT

JOB NUMBER  
 18639,519.02

APPROVED

DATE  
 8/91

REVISED DATE

Blows / 6"	OVA (ppm)	Sample Number
13		
16		
18	0	9105H581
6		
22		
33	4	9105H582
10		
5		
1	1	
14		
18	2	
16		
5		
7		
18		
27		
40		
50		

Depth (ft)  
Sample

Log of Boring: PA18B002  
Equipment: MOBILE B-53 (HSA), 9.0 in. diam.  
Date: 01/29/1991  
Elevation: GS 18.58 feet  
Total Depth: 12.5 ft.

ASPHALT

OLIVE GRAY WELL-GRADED GRAVEL WITH SAND (GW)  
5Y4/2, loose, moist,  
60-70% gravel, 30-40% fine to  
coarse-grained sand, fill

GREENISH GRAY SERPENTINITE BOULDER FILL  
intensely to closely fractured  
Deeply weathered from 1 to 1.7 ft.

VERY DARK GRAYISH BROWN POORLY GRADED SAND WITH  
SILT (SP-SM), 2.5Y3/2, medium dense, moist,  
60-80% fine to medium-grained sand,  
20-40% silt, fill

DARK GRAYISH BROWN POORLY GRADED SAND (SP)  
2.5Y4/2, loose,  
95-100% fine to medium-grained sand,  
0-5% silt, fill

VERY DARK GRAYISH BROWN CLAYEY GRAVEL WITH SAND (GC)  
2.5Y3/2, loose to medium dense, moist,  
50% well-graded gravel with up to 5%  
concrete, 30% fine to medium-grained  
sand, 20% lean clay, fill

DEBRIS ZONE  
mostly brick and rock debris, fill

DARK GRAY SILTY SAND WITH GRAVEL (SM)  
5Y4/1, loose, moist,  
50-60% fine to coarse-grained sand,  
20-30% well-graded serpentinite gravel,  
20% silt, fill

Trace chert and brick fragments at  
7.5 ft.

DEBRIS ZONE

Drilling halted due to OVA readings exceeding  
10 ppm in the breathing zone. Bottom of boring  
at 12.5 feet. Boring backfilled with bentonite  
cement grout (01/29/91)

**DRAFT**



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Engineering and  
Environmental Services

Log of Boring: PA18B002  
Site Inspection - PA-18  
Naval Station, Treasure Island, Hunters Point Annex  
San Francisco, California

PLATE

**C14**

DRAWN  
GDT

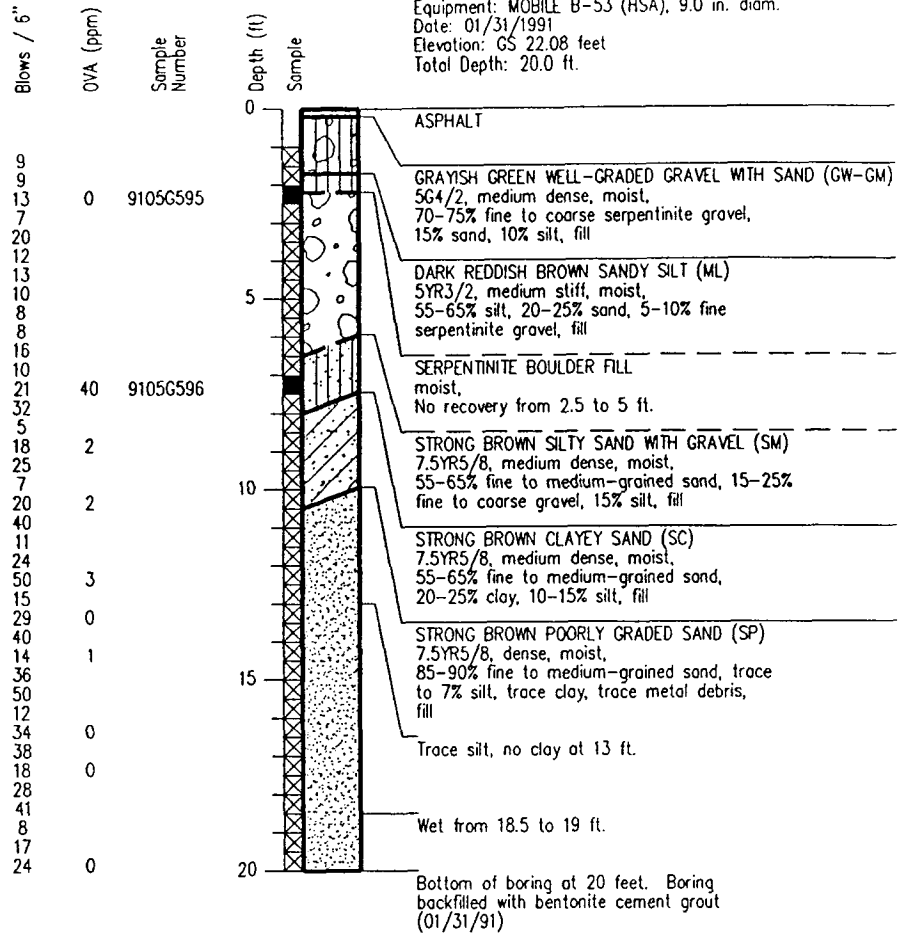
JOB NUMBER  
18639,519.02

APPROVED

DATE  
8/91

REVISED DATE

Log of Boring: PA18B003  
 Equipment: MOBILE B-53 (HSA), 9.0 in. diam.  
 Date: 01/31/1991  
 Elevation: GS 22.08 feet  
 Total Depth: 20.0 ft.



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Log of Boring: PA18B003  
 Site Inspection - PA-18  
 Naval Station, Treasure Island, Hunters Point Annex  
 San Francisco, California

PLATE

**C15**

DRAWN  
 GDT

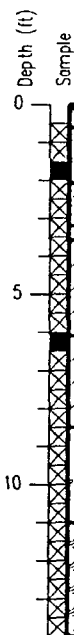
JOB NUMBER  
 18639,519.02

APPROVED

DATE  
 8/91

REVISED DATE

Blows / 6"	OVA (ppm)	Sample Number
8		
7		
12	0	9105H579
5		
14	0	
30		
11		
12	0	
20		
4	0	
7	0	
9	1	9105H580
5		
10		
14	0	
10		
23	0	
17		
3		
4	0	
7		
7		
11	0	
27		
6		
17		
18	0	



Log of Boring: PA18B004  
 Equipment: Mobile B-53 (HSA), 9.0 in. diam.  
 Date: 01/29/1991  
 Elevation: GS 20.25 feet  
 Total Depth: 14.0 ft.

ASPHALT

OLIVE WELL-GRADED GRAVEL WITH SAND (GW)  
 5Y4/3, loose, moist,  
 60-70% subangular gravel, 30-40% well-graded  
 fine to coarse-grained sand, fill

VERY DARK GRAYISH BROWN SILT WITH SAND (ML)  
 10YR3/2, stiff, dry,  
 70-90% silt, 10-25% fine to medium-grained  
 sand, 0-5% subrounded fine gravel, trace  
 wood fragments, fill  
 Increase sand with depth

VERY DARK GRAYISH BROWN POORLY GRADED SAND (SP)  
 2.5Y3/2, loose, moist,  
 90-100% medium-grained sand, 0-10% silt

BLACK GRAVELLY LEAN CLAY (CL)  
 5Y2.5/2, medium stiff, dry,  
 70-80% clay, 20-30% gravel, fill

GRAYISH GREEN LEAN CLAY WITH GRAVEL (CL)  
 5G4/2, stiff, dry,  
 80-90% clay, 10-20% gravel, fill

DARK GREENISH GRAY LEAN CLAY (CL)  
 5G4/1, medium stiff, dry,  
 95-100% clay, 0-5% silt, fill

Loose, very fine-grained sand lens  
 at 7.9 ft.

GRAY WELL-GRADED GRAVEL (GW)  
 7.5YR5/0, dense, dry,  
 mostly serpentinite gravel, fill

GRAYISH GREEN SERPENTINITE  
 5G4/2,  
 deeply weathered bedrock

Bottom of boring at 14 feet. Boring  
 backfilled with bentonite cement grout  
 (01/30/91)

**DRAFT**



Harding Lawson Associates  
 Engineering and  
 Environmental Services

Log of Boring: PA18B004  
 Site Inspection - PA-18  
 Naval Station, Treasure Island, Hunters Point Annex  
 San Francisco, California

PLATE

**C16**

DRAWN  
 GDT

JOB NUMBER  
 18639,519.02

APPROVED

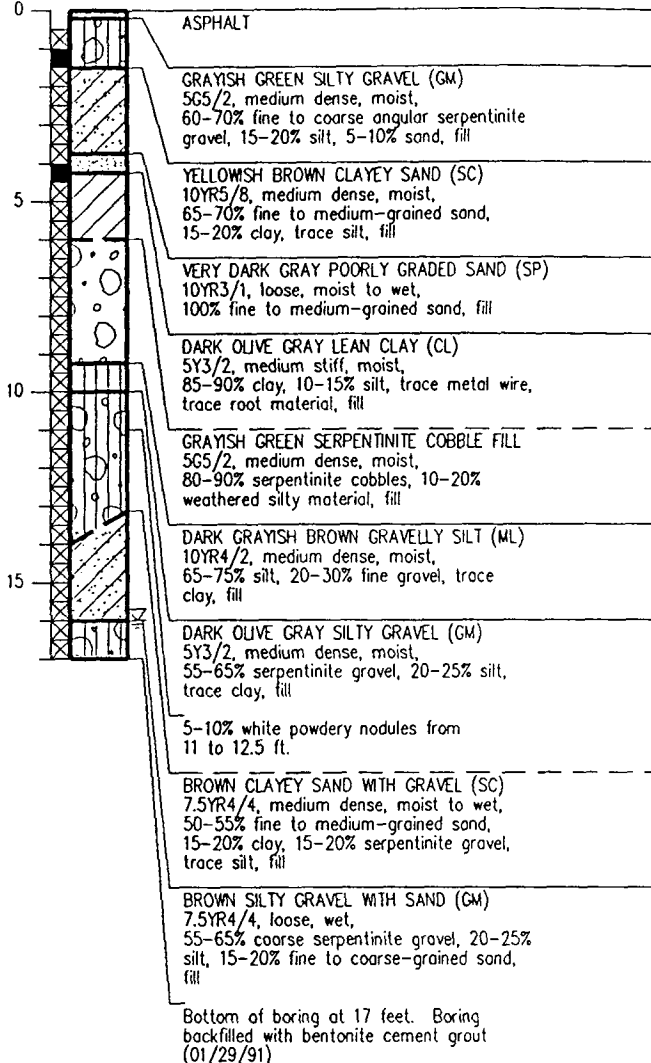
DATE  
 8/91

REVISED DATE

Blows / 6"	OVA (ppm)	Sample Number
16	0	9105G585
19		
12		
5	2	
8		
18		
8	20	9105G586
8		
10		
9	1	
16		
26		
7	1	
19		
20	1	
7		
9	1	
11		
7		
9	1	
18		
9	1	
7		
7		
2	1	
7		
23		
6	2	
6		
5		
3		
5	2	
6		

Depth (ft)  
Sample

Log of Boring: PA18B005  
Equipment: MOBILE B-53 (HSA), 9.0 in. diam.  
Date: 01/28/1991  
Elevation: GS 18.86 feet  
Total Depth: 17.0 ft.



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Log of Boring: PA18B005  
Site Inspection - PA-18  
Naval Station, Treasure Island, Hunters Point Annex  
San Francisco, California

PLATE

**C17**

DRAWN  
GDT

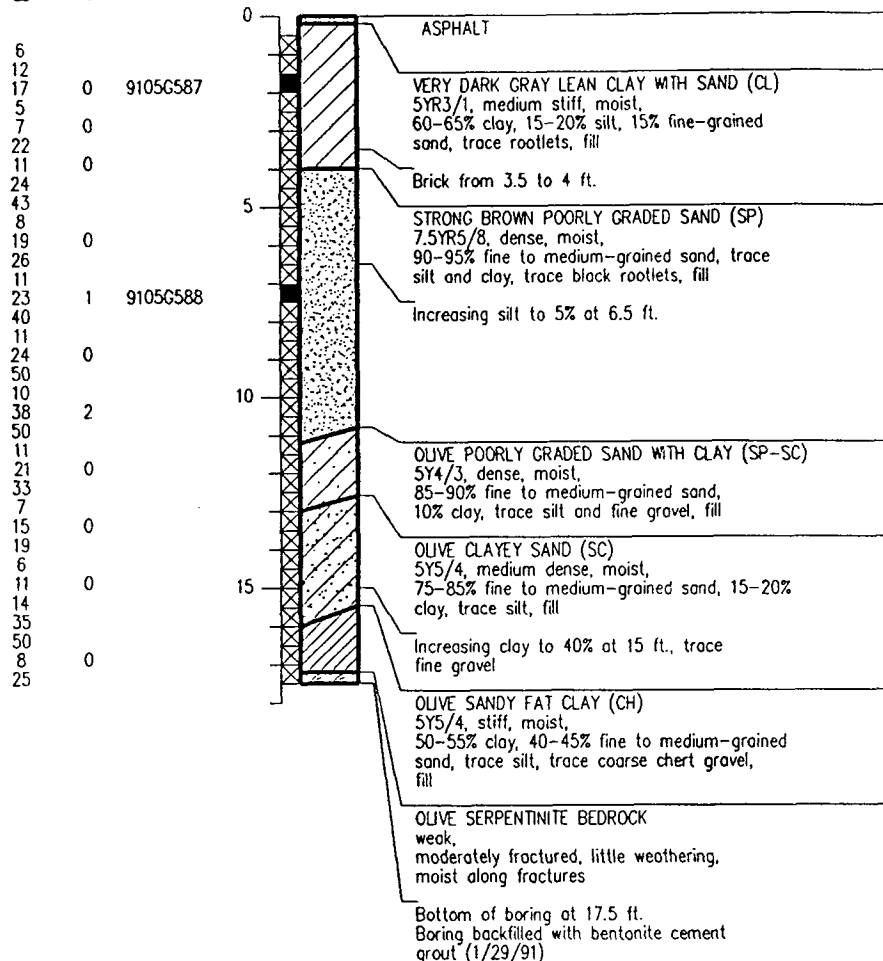
JOB NUMBER  
18639,519.02

APPROVED

DATE  
8/91

REVISED DATE

Log of Boring: PA18B006  
 Equipment: MOBILE B-53 (HSA), 9.0 in. diam.  
 Date: 01/29/1991  
 Elevation: GS 23.93 feet  
 Total Depth: 17.5 ft.



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Log of Boring: PA18B006  
 Site Inspection - PA-18  
 Naval Station, Treasure Island, Hunters Point Annex  
 San Francisco, California

PLATE

**C18**

DRAWN  
 GDT

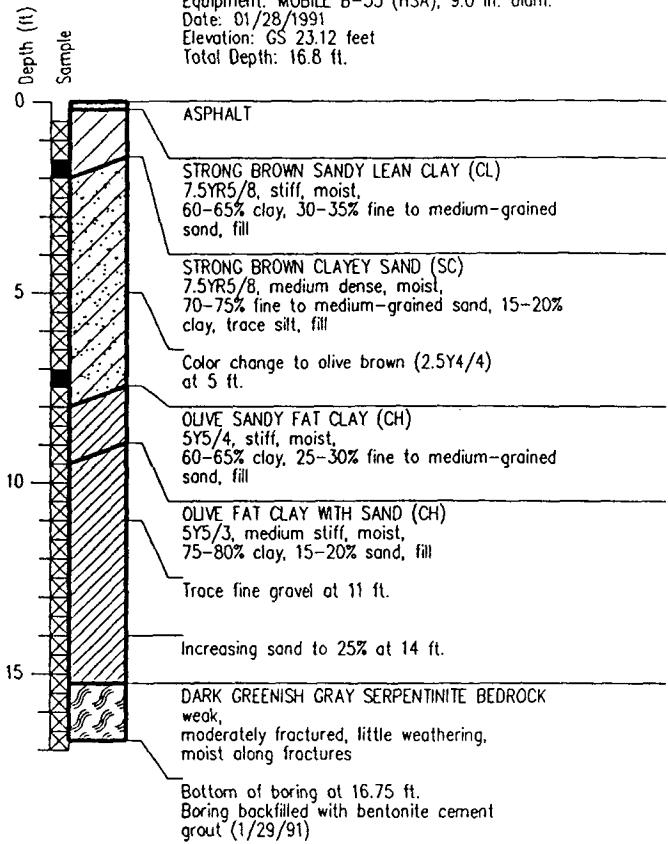
JOB NUMBER  
 18639,519.02

APPROVED

DATE  
 8/91

REVISED DATE

Blows / 6"	OVA (ppm)	Sample Number
14		
15		
24	0	9105G589
6		
11	0	
16		
5		
7	0	
16		
5		
11	0	
27		
5		
16	0	9105G590
33		
6		
13	0	
28		
5		
12	0	
25		
7		
15	0	
21		
4		
10	0	
14		
3		
7	0	
18		
16		
29	0	
50		



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 Environmental Services

Log of Boring: PA18B007  
 Site Inspection - PA-18  
 Naval Station, Treasure Island, Hunters Point Annex  
 San Francisco, California

PLATE

**C19**

DRAWN  
 GDT

JOB NUMBER  
 18639,519.02

APPROVED

DATE  
 8/91

REVISED DATE

Log of Boring: PA18MW08A  
 Equipment: MOBILE B-53 (HSA), 11.0 in. diam.  
 Date: 01/31/1991  
 Elevation: GS 25.12 feet  
 Total Depth: 28.5 ft.

CHRISTY BOX  
 BOREHOLE  
 11.00 IN. DIAMETER

GROUT  
 Portland Type I-II  
 0.50 - 6.00 ft.

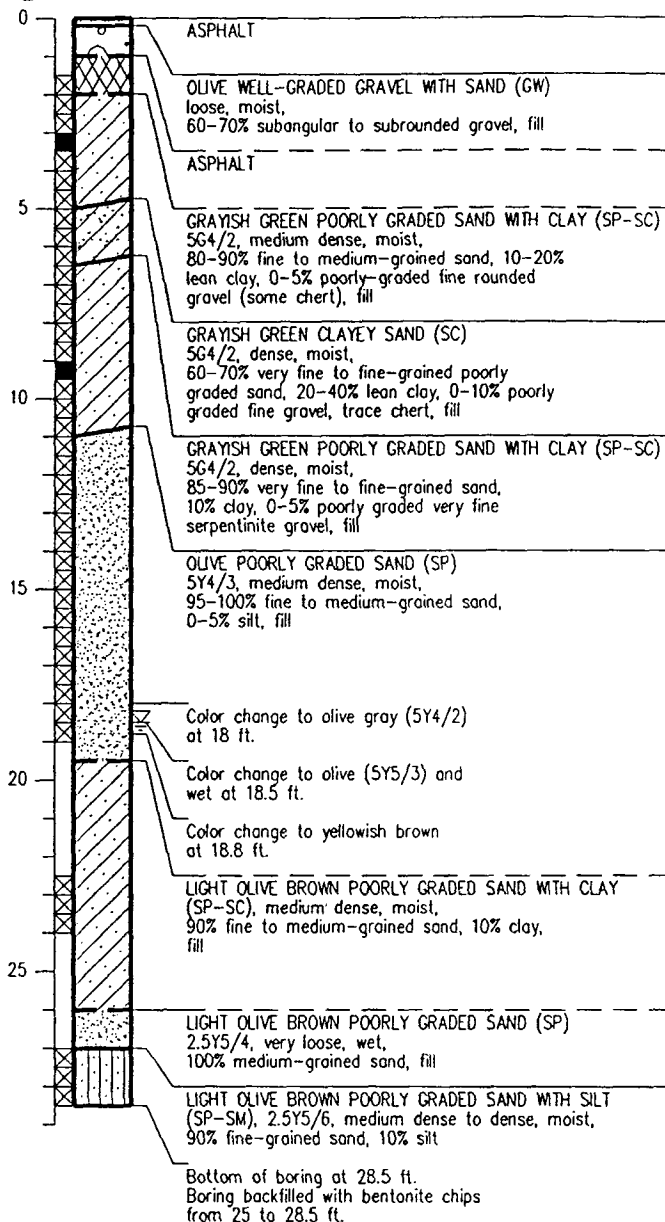
BLANK CASING  
 4.00 IN. DIAMETER  
 0.50 - 10.00 ft.

BENTONITE SEAL  
 Pellets  
 6.00 - 7.80 ft.

SANDPACK  
 RMC Lonestar #2/16  
 7.80 - 25.00 ft.

SLOTTED SCREEN  
 Schedule 40 PVC  
 (0.02 IN. SLOTSIZE)  
 10.00 - 25.00 ft.

Blows / 6"	OVA (ppm)	Sample Number
50	7	
6		
10		
15	0	9105H585
5		
7		
8	0	
5		
8	0	
26		
4		
15	0	
28		
6		
14		
31	0	9105H586
6		
17	0	
22		
8		
19	0	
28		
7		
35	0	
50		
7		
38	0	
45		
19		
50	0	
17		
50	0	
10		
35	0	
44		
15		
21	0	
31		
36		
45		
39		



**DRAFT**



Harding Lawson Associates  
 Engineering and  
 Environmental Services

Log of Boring and Well Completion Detail: PA18MW08A  
 Site Inspection - PA-18  
 Naval Station, Treasure Island, Hunters Point Annex  
 San Francisco, California

PLATE

**C20**

DRAWN  
 GDT

JOB NUMBER  
 18639,519.02

APPROVED

DATE  
 9/91

REVISED DATE



CHRISTY BOX  
BOREHOLE  
11.00 IN. DIAMETER

GROUT  
Portland Type I-II  
1.00 - 5.00 ft.

BLANK CASING  
4.00 IN. DIAMETER  
0.50 - 10.00 ft.

BENTONITE SEAL  
Pellets  
5.00 - 7.00 ft.

SANDPACK  
RMC Lonestar #2/16  
7.00 - 25.00 ft.

SLOTTED SCREEN  
Schedule 40 PVC  
(0.02 IN. SLOTSIZE)  
10.00 - 25.00 ft.

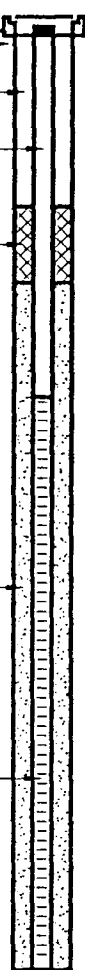
Blows / 6"

OVA (ppm)

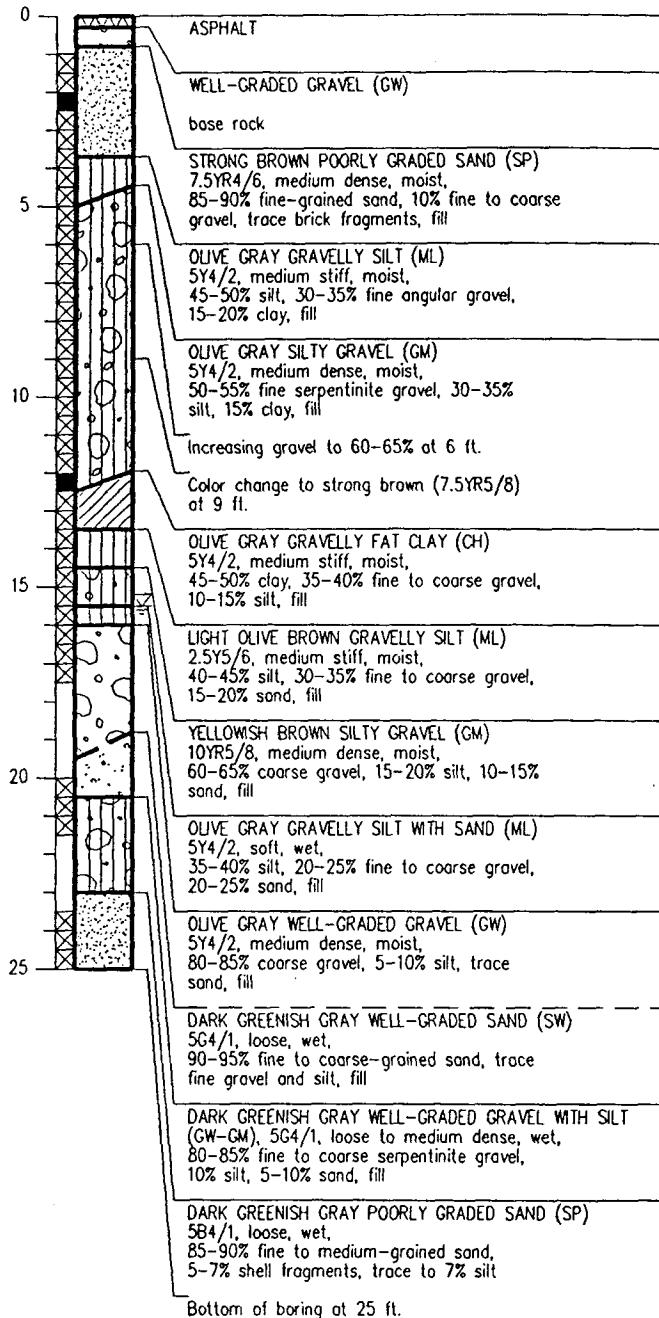
Sample  
Number

Depth (ft)  
Sample

Log of Boring: PA18MW09A  
Equipment: MOBILE B-53 (HSA), 11.0 in. diam.  
Date: 01/30/1991  
Elevation: GS 18.03 feet  
Total Depth: 25.0 ft.



6		
7		
14	0	9105G591
5		
7		
14	0	
6		
9	0	
7		
4		
5	0	
14		
7		
13	0	
14		
5		
10	0	
8		
4		
5	0	
6		
5		
6	1	9105G592
7		
3		
5	0	
7		
7	0	
7		
6		
7		
5		
4		
3		
3	0	
3		
3		
3		
2	0	
2		



**DRAFT**



Harding Lawson Associates  
Engineering and  
Environmental Services

Log of Boring and Well Completion Detail: PA18MW09A  
Site Inspection - PA-18  
Naval Station, Treasure Island, Hunters Point Annex  
San Francisco, California

PLATE

**C21**

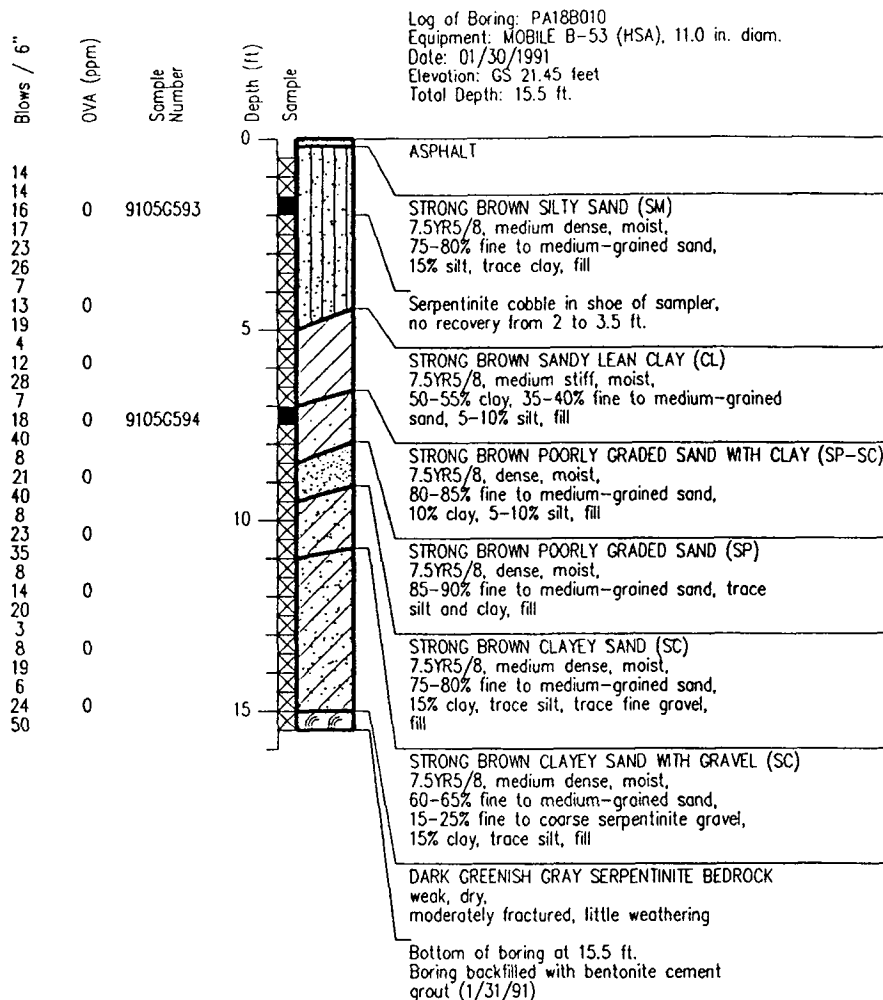
DRAWN  
GDT

JOB NUMBER  
18639,519.02

APPROVED

DATE  
9/91

REVISED DATE



**DRAFT**



Harding Lawson Associates  
 Engineering and  
 Environmental Services

Log of Boring: PA18B010  
 Site Inspection - PA-18  
 Naval Station, Treasure Island, Hunters Point Annex  
 San Francisco, California

PLATE

**C22**

DRAWN  
 GDT

JOB NUMBER  
 18639,519.02

APPROVED

DATE  
 8/91

REVISED DATE

**Appendix D**  
**DATA VALIDATION REPORTS**

## **APPENDIX D**

### **DATA VALIDATION REPORTS**

#### **D.1.0 INTRODUCTION**

The following QA/QC Data Review Summary reports, prepared by PRC Environmental Management, Inc., present the results of analysis of laboratory holding times and QC samples for each laboratory batch number. Laboratory QC results evaluated consist of blanks, matrix duplicates, matrix spike/matrix spike duplicates (MS/MSD), method blank spike/method blank spike duplicates (MBS/MBSD), and surrogate spikes.

The sample results and supporting QC sample results were analyzed in 14 laboratory batches. Lab batches 6090, 6116, and 6065 include groundwater samples and field, trip and equipment blanks. Lab batches 5888 and 6008 include only equipment and trip blanks. Lab batches 5849, 5863, 5887, 5918 and 5919 contain analyses for soil samples from PA-16, and lab batches 5957, 5975, 6009 and 6021 contain soil samples from PA-18.

#### **D.1.1 Data Qualifiers**

The analytical data have been qualified and appear in Tables 9, 10, 12, 22, 23, and 25 with both laboratory-assigned qualifiers and qualifiers assigned during the "cursory" validation process. The first qualifier in the sequence is one of the four project assigned qualifiers A, J, U, or R. The four qualifiers imply that the data is: (1) accepted and considered accurate (A), (2) considered qualitatively accurate but quantitatively estimated (J), (3) undetected at the concentration presented (U), or (4) unusable and rejected (R). Following the project qualifier, either a back slash (/)

and/or numerical characters (e.g. 123456789) followed by back slash (/) or no back slash appear. The numerical characters relate to the preceding qualifier assigned during the data validation process. Qualifiers appearing before the back slash are validation assigned qualifiers; qualifiers presented after the back slash are laboratory assigned qualifiers. Explanations of the individual qualifiers appear at the end of the data tables.

The following are presented as examples.

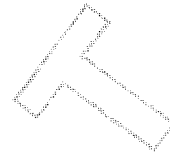
- |               |                                                                                                                                                                                                                                                                                        |
|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 10 A:         | The value 10 is accurate and acceptable.                                                                                                                                                                                                                                               |
| 10 J:         | The value is considered an estimate because its quantification is below the CRDL (CLP inorganics) or the CRQL (CLP organics).                                                                                                                                                          |
| 10 J2:        | The value 10 is considered estimated because of the defined meaning of the "2".                                                                                                                                                                                                        |
| 10 J23:       | The value 10 is considered estimated because of the defined meaning of both the "2" and the "3".                                                                                                                                                                                       |
| 10 J23/*N:    | The value 10 is considered estimated because of the defined meaning of both the "2" and the "3". The "*" and the "N" are laboratory assigned qualifiers.                                                                                                                               |
| 10 UIJ23/*N:  | The value 10 is considered undetected because of the defined meaning of the "1". The information encoded in the "J23" qualifiers applies to the data but takes lower priority to the information encoded in the "U1" qualifier. The "*N" are laboratory assigned qualifiers.           |
| 10 UIJ23/J*N: | The value 10 is considered undetected because of the defined meaning of the "1". The information encoded in the J23 qualifiers applies to the data but takes lower priority to the information encoded in the "U1" qualifier. The "J" and the "*N" are laboratory assigned qualifiers. |

#### **D.1.2 Cursory Validation QA/QC Data Review Summaries and Reports**

The following reports, prepared by PRC Environmental Management, Inc., present the results of a cursory review of laboratory holding times and QC samples for each laboratory batch number. Based on these reviews, qualifiers were assigned as described above.

#### **D.1.3 Full-CLP Validation QA/QC Data Review Summaries and Reports**

The following reports, prepared by PRC Environmental Management Inc. present the results of a "full-CLP" review for 10 percent of the samples collected. Based on these reviews, qualifiers were assigned as described above.



## CURSORY VALIDATION REPORTS



## QA/QC DATA REVIEW SUMMARY

### 1.0 QA\QC Narrative

Site: Hunters Point Annex (CTO 0106)  
Laboratory: NET Pacific, Inc.  
QA Reviewer: Thorsten Anderson, PRC  
Review Date: May 22, 1991

Batch No.: 9105H583 (NET Nos. 5888 and 6008)  
Sample No.: 9105H583, 9105H584, 9106H597, and 9106H598  
Analyses: Volatiles, semi-volatiles, pesticides/PCBs, metals (including molybdenum), cyanide, TPH diesel, TPH gasoline, oil and grease, and pH

Collection Date: January 31 and February 7, 1991  
QC Criteria Reviewed: Holding time, laboratory blanks, surrogate recoveries, matrix spike/matrix spike duplicate, matrix duplicate and blind spike

The data were reviewed according to EPA documents "Laboratory Data Validation Functional Guidelines for Evaluating Organic Analyses" (February 1988) and "Laboratory Data Validation Functional Guidelines for Evaluating Inorganic Analyses" (July 1988).

### Comments

1. Due to holding time problems, the results for the following analytes are considered estimated (J) and usable for limited purposes only.

- Cyanide in sample 9106H598
- TPH gasoline in samples 9105H583 and 9106H598

The technical holding times were met for all analyses except cyanide and TPH gasoline. Cyanide was analyzed in sample 9106H598 fifteen days after collection. TPH gasoline was analyzed in samples 9105H583 and 9106H598 eight and nine days after collection.

2. Due to blank contamination problems, the results for the following analytes are considered non-detected and estimated (UJ) and usable for limited purposes only.

- Methylene chloride in sample 9106H597
- bis(2-ethylhexyl)phthalate in sample 9106H598

Methylene chloride and acetone were found in one volatile laboratory blank at concentrations of 3.6  $\mu\text{g/L}$  and 6.3  $\mu\text{g/L}$ , respectively. Bis(2-ethylhexyl)phthalate was not found in the semi-volatile laboratory blanks, but is considered a common laboratory contaminant. Aldrin was found in the laboratory blank at a concentration of 0.039  $\mu\text{g/L}$ . No aldrin or acetone results were qualified because they were not detected in the samples. The quantitation limits for the samples listed above may have been raised according to the blank qualification rules.

3. Due to accuracy problems, the results for the following analyte are considered estimates (J) and usable for limited purposes only.

- Thallium in samples 9105H583 and 9106H598

The matrix spike recovery for thallium was 68.2% (75-125% QC limit). The sample results are biased low for thallium.



The matrix spike and blank spike recoveries for selenium were above the QC acceptance limits, but the samples were not qualified because the sample results were non-detected.

4. Due to precision problems, the results for the following analytes are considered estimates (J) and usable for limited purposes only.

- Antimony and zinc in samples 9105H583 and 9106H598

The relative percent differences of antimony and zinc were 126% and 113% (20% QC limit) in the matrix duplicate sample.

5. The following problems were observed with the matrix spike/matrix spike duplicate (MS/MSD) samples and the blank spike sample.

- Low recovery of 8% and poor RPD of 165% for 4-nitrophenol in the semi-volatile MSD sample
- High recovery of 135% and poor RPD of 118% for pentachlorophenol in the semi-volatile MS sample
- High percent recoveries of 122-149% for gamma-BHC, aldrin, dieldrin, endrin, and 4,4'-DDT in the pesticide/PCB MSD sample
- High percent recoveries of 160-166% for endrin in the pesticide/PCB MS/MSD samples
- High recovery of 160% for endrin in the pesticide/PCB blank spike sample

These semi-volatile and pesticide/PCB spiking problems are not expected to affect the sample results because of acceptable surrogate recoveries.

6. All quality control criteria reviewed, other than those discussed above, were met and are considered acceptable. All other results are considered valid and usable for all purposes.

Page 1 of 16

Sample Matrix Water

analyze 40 days)

analyze 40 days)

## Analyze

[illegible]

**Note: all holding times in days**

## 2.1 REVIEW OF HOLDING TIMES INORGANIC CLP ANALYSES

Page 2 of 16Laboratory NET

Sample Delivery Group 9105MS83

QA Reviewer/Firm TA/PRC

Review Date 9-22-91

Sample Matrix Water

ANALYSIS DATE/HOLDING TIME

[illegible]

[1] =Including Molybdenum

\* = Holding Time exceeded

**Note: all holding times in days**

Page 3 of 16

ANALYSIS DATE/HOLDING TIME

**Chromium VI**  
**soil: 7 days for extract;**  
**24 hours analysis**  
**water: 24 hour analysis**

[illegible]

\* = Holding Time exceeded  
Note: all holding times in days.

Page 4 of 16

ANALYSIS AND/OR EXTRACTION DATE/HOLDING TIME

[illegible]

\* = Holding Time exceeded  
Note: all holding times in days.

Page 5 of 16

## ADJUSTED AND QUALIFIED SAMPLES

Sample Matrix Water

9106H597

Lab. Blank Sample Number & detected analytes	Concentration (ug/l)	5 or 10x Value	Sample Number: (Old value/New Value)	Sample Number: (Old value/New Value)	Sample Number: (Old value/New Value)	Sample Number: (Old value/New Value)	Sample Number: (Old value/New Value)
-------------------------------------------------	-------------------------	-------------------	-----------------------------------------	-----------------------------------------	-----------------------------------------	-----------------------------------------	-----------------------------------------

[illegible]

Laboratory NET  
Sample Delivery Group 9105H583  
QA Reviewer/Firm TA PRC  
Review Date 5-22-91  
Sample Matrix Water

## ADJUSTED AND QUALIFIED SAMPLES

91064598  
Sample Number

Lab. Blank Sample Number & detected analytes	Concentration (ug/l)	5 or 10x Value	Sample Number (Old value/New Value)	Sample Number (Old value/New Value)	Sample Number (Old value/New Value)	Sample Number (Old value/New Value)	Sample Number (Old value/New Value)
-------------------------------------------------	-------------------------	-------------------	----------------------------------------	----------------------------------------	----------------------------------------	----------------------------------------	----------------------------------------

[illegible]

### 3.2 LABORATORY BLANK REVIEW CLP PESTICIDES/PCBs

Page 7 of 16

Laboratory NET  
Sample Delivery Group 91054583  
QA Reviewer/Firm TA/PRC  
Review Date 5-22-91  
Sample Matrix Water

## ADJUSTED AND QUALIFIED SAMPLES

Lab. Blank Sample Number & detected analytes	Concentration (ug/l)	5 or 10x Value
-------------------------------------------------	-------------------------	-------------------

Sample Number  
(Old value/New Value)

Sample Number  
(Old value/New Value)

Sample Number  
(Old value/New Value)

Sample Number  
(Old value/New Value)

Sample Number  
(Old value/New Value)

[illegible]



## Page 8 of 16

## QUALIFIED SAMPLES

[illegible]

[1] = laboratory blank, e.g. ICB,CCB,PB,etc.

Page 9 of 16

### QUALIFIED SAMPLES

[1] = laboratory blank, e.g. PB etc.

# 4.0 REVIEW OF SURROGATE RECOVERIES CLP ORGANICS

Page 10 of 16

Laboratory NET  
Sample Delivery Group 9105H583  
QA Reviewer/Firm TA/PRC  
Review Date 5-22-91  
Sample Matrix Water

	QC LIMIT		<u>9105H583</u>	<u>9105H584</u>	<u>9106H597</u>	<u>9106H598</u>	
	Water	Soil	Sample Number	Sample Number	Sample Number	Sample Number	Sample Number
VOLATILES			Surrogate Value	Surrogate Value	Surrogate Value	Surrogate Value	Surrogate Value
toluene-d8	88-110	81-117	108	105	110	99	
bromofluorobenzene	86-115	74-121	107	105	101	95	
1,2-dichloroethane-d4	76-114	70-121	96	97	112	112	
			Qualifier	Qualifier	Qualifier	Qualifier	Qualifier
SEMIVOLATILES							
nitrobenzene-d5	35-114	35-114 23-120	60			64	
2-fluorobiphenyl	43-116	43-116 30-115	64			67	
terphenyl-d14	33-141	33-141 18-137	71	NA	NA	97	
phenol-d5	10.0-94	10.0-94 24-113	63			62	
2-fluorophenol	21-100	21-100 25-121	60			59	
2,4,6-tribromophenol	10-123	10-123 14-122	71			85	
			Qualifier	Qualifier	Qualifier	Qualifier	Qualifier
PESTICIDES/PCBs							
dibutylchlorodate	24-154	20-150	91	NA	NA	83	
			Qualifier	Qualifier	Qualifier	Qualifier	Qualifier

\* = Values outside of QC limits

# 4.1 REVIEW OF SURROGATE RECOVERIES non-CLP ORGANICS

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Laboratory NET  
Sample Delivery Group 9105H583  
QA Reviewer/Firm TA/PRC  
Review Date 5-22-91  
Sample Matrix Water

	QC LIMIT Water	Soil
METHOD 8010		
bromochloromethane		
2-bromo-1-chloropropane		
1,4-dichlorobutane		

METHOD 8020		
alpha,alpha, alpha,- trifluorotoluene		

TPH Gasoline		
Bromofluorobenzene	50-150	50-150

<u>9105H583</u>	<u>9106H598</u>			
Sample Number	Sample Number	Sample Number	Sample Number	Sample Number
Surrogate Value	Surrogate Value	Surrogate Value	Surrogate Value	Surrogate Value
Qualifier__	Qualifier__	Qualifier__	Qualifier__	Qualifier__
Qualifier__	Qualifier__	Qualifier__	Qualifier__	Qualifier__
Qualifier__	Qualifier__	Qualifier__	Qualifier__	Qualifier__
<u>91</u>	<u>94</u>			
Qualifier__	Qualifier__	Qualifier__	Qualifier__	Qualifier__

\* = Values outside of QC limits

# 5.0 REVIEW OF MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERIES AND RPDs CLP ORGANICS

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Laboratory NET  
Sample Delivery Group 9105H583  
QA Reviewer/Firm TA/PRC  
Review Date 6-22-91  
Sample Matrix Water

## ADJUSTED AND QUALIFIED SAMPLES

	QC LIMITS (%R / %RPD)		N/A Sample Number (-81783/-81784)			N/A Sample Number			9107X057 Sample Number		
	Water	Soil	MS %R	MSD %R	RPD	MS %R	MSD %R	RPD	MS %R	MSD %R	RPD
<b>VOLATILES (VOC)</b>											
1,1-dichloroethene	61-145/14	59-172/22	94	97	3.6				89	86	3.9
trichloroethene	71-120/14	62-137/23	94	98	4.8				93	87	6.8
benzene	76-127/11	66-142/21	76	82	7.3				76	79	2.9
toluene	76-125/13	59-139/21	94	99	5.8				90	88	1.6
chlorobenzene	75-130/13	60-133/21	89	94	4.8				95	90	4.5
<b>SEMIVOLATILES (SOC)</b>											
phenol	12-89/42	26-90/35	48	52	7	66	68	3.0			
2-chlorophenol	27-123/40	25-102/50	46	53	14	72	71	1.4			
1,4-dichlorobenzene	36-97/28	28-104/27	48	46	4	67	76	12			
N-nitroso-di-n-propylamine	41-116/38	41-126/38	62	56	10	69	74	7.0			
1,2,4-trichlorobenzene	39-98/28	38-107/23	57	52	9	67	74	9.9			
4-chloro-3-methylphenol	23-97/42	26-103/33	68	63	7	81	82	1.2			
acenaphthene	46-118/31	31-137/19	66	60	10	74	78	5.3			
4-nitrophenol	10-80/50	11-114/50	78	8*	165*	91	78	5.6			
2,4-dinitrotoluene	24-96/38	28-89/47	67	65	3	70	86	5.6			
pentachlorophenol	9-103/50	17-109/47	135*	35	118*	74	78	5.3			
pyrene	26-127/31	35-142/36	65	66	2	92	96	4.3			
<b>PESTICIDES/PCBs</b>											
gamma-BHC (lindane)	56-123/15	46-127/50	108	112	5.0	122	146*	18*			
heptachlor	40-131/20	35-130/31	81	81	0.0	90	102	13			
aldrin	40-120/22	34-132/43	91	106	9.0	112	122*	9.0			
dieldrin	52-126/18	31-134/38	117	120	3.0	121	149*	21*			
endrin	56-121/21	42-139/45	1160*	166*	4.0	111	142*	25*			
4,4'-DDT	38-127/27	23-134/50	114	120	5.0	101	146*	36*			

\* = Values outside of QC limits

# 5.1 REVIEW OF MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERIES AND RPDs NON-CLP ANALYTES

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Laboratory NET  
Sample Delivery Group 9105H583  
QA Reviewer/Firm TA/PRC  
Review Date 05-22-01  
Sample Matrix Water

## ADJUSTED AND QUALIFIED SAMPLES

	QC LIMITS (%R / %RPD)		<u>N/A</u> Sample Number			<u>9105H583</u> Sample Number			<u>9106H598</u> Sample Number		
	Water	Soil	MS %R	MSD %R	RPD	MS %R	MSD %R	RPD	MS %R	MSD %R	RPD
METHOD 8010											
1,1-dichloroethene	61-145/14	59-172/22									
chloroform											
bromodochloromethane											
trichloroethene	71-120/14	62-137/24									
tetrachloroethene											
chlorobenzene	75-130/13	60-133/21									
METHOD 8020											
toluene	76-125/13	59-139/21									
benzene	76-127/11	66-142/21									
			(-81778 / -81779)								
TPH Diesel	50-150/50	50-150/50	89	79	12				91	78	14
TPH Gasoline	50-150/50	50-150/50				110	117	6.2			
			(-81741 / -81742)								
Oil and Grease	85-115/30	85-115/30	98	105	7.9				107	105	1.9
Chloride	50-150/50	50-150/50									
Nitrate	50-150/50	50-150/50									
Sulfate	50-150/50	50-150/50									
o-Phosphate	50-150/50	50-150/50									
Chromium VI	70-130/30	70-130/40									
Total Dissolved Solids	70-130/15	NA									

\* = Values outside of QC limits

## Page 14 of 16

SAMPLE NUMBER	9105x057
DUPLICATE SAMPLE NUMBER	- 81794

91054583 91064598 \_\_\_\_\_  
Sample Number Sample Number Sample Number Sample Number Sample Number

\* = RPD exceeds QAPP limit.  
# = RPD exceed Functional Guideline limit (CLP inorganics only)

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### QUALIFIED ASSOCIATED SAMPLES

Sample Number    Sample Number    Sample Number    Sample Number    Sample Number

[illegible]

T=total concentration found in spiked sample.  
A=actual spike concentration added to sample.  
\* = exceeds QAPP limit  
# = exceeds Functional Guideline Limit



Laboratory NET  
Sample Delivery Group 9105H583  
QA Reviewer/Firm TA/PRC  
Review Date 9-22-91  
Sample Matrix Water

## QUALIFIED ASSOCIATED SAMPLES

Sample Number	Sample Number	Sample Number	Sample Number	Sample Number
91054583	91064598			
Value/Qualifier	Value/Qualifier	Value/Qualifier	Value/Qualifier	Value/Qualifier

[illegible]

## QA/QC DATA REVIEW SUMMARY

### 1.0 QA/QC Narrative

Site: Hunters Point Annex (CTO 0106)  
Laboratory: NET Pacific, Inc.  
QA Reviewer: Thorsten Anderson, PRC  
Review Date: May 20, 1991

Batch No.: 9106G601 (NET Nos. 5957 and 6021)  
Sample No.: 9106G601, 9106G602, 9106H587 through 9106H590, 9106G605, and 9106G606  
Analyses: Volatiles, semi-volatiles, pesticides/PCBs, metals (including molybdenum), cyanide, TPH diesel, TPH gasoline, oil and grease, and pH

Collection Date: February 4 through 7, 1991  
QC Criteria Reviewed: Holding time, laboratory blanks, surrogate recoveries, matrix spike/matrix spike duplicate, matrix duplicate and blind spike

The data were reviewed according to EPA documents "Laboratory Data Validation Functional Guidelines for Evaluating Organic Analyses" (February 1988) and "Laboratory Data Validation Functional Guidelines for Evaluating Inorganic Analyses" (July 1988).

#### Comments

1. Due to holding time problems the results for the following analytes are considered estimated (J) and usable for limited purposes only.

- Mercury in samples 9106G601, 9106G602, and 9106H587 through 9106H590
- pH in samples 9106G605 and 9106G606

Technical holding times were met for all analyses except mercury and pH. Mercury was analyzed 1-2 days after the holding time. The pH was measured 1 day after the holding time.

2. Due to blank contamination problems, the results for the following analytes are considered non-detected and estimated (UJ) and usable for limited purposes only.

- Methylene chloride in samples 9106G601, 9106H587, 9106H588, and 9106H590
- Heptachlor in all samples analyzed

Methylene chloride was not found in the volatile laboratory blanks, but is considered a common laboratory contaminant. Heptachlor was found in the laboratory blanks associated with this sample group at concentrations of 3.6-210 µg/kg. The quantitation limits for these samples may have been raised according to the blank qualification rules.

3. Due to surrogate recovery problems, the results for the following analytes are considered estimated (J) and usable for limited purposes only.

- TPH gasoline in samples 9106G601, 9106G602, and 9106H587 through 9106H590
- All pesticide/PCB analytes in sample 9106G605

The recoveries of the TPH gasoline surrogate, bromofluorobenzene, were 21-48% in the samples listed above. These recoveries were below the 50-150% QC acceptance limits.

The pesticide/PCB surrogate recovery was 170% (20-150% QC limit) in sample 9106G605.

4. Due to accuracy problems, the results for the following analytes are considered estimates (J) and usable for limited purposes only.

- Antimony and calcium in all samples analyzed

The matrix spike recovery for antimony was 65.4% (75-125% QC limit). The blank spike recovery for calcium was 158.9% (70-130% QC limit). The sample results are biased low for antimony and biased high for calcium.

5. High percent recoveries of 134-149% were reported for gamma-BHC, heptachlor, and aldrin in the pesticide/PCB matrix spike/matrix spike duplicate samples. High recoveries of 143% were also reported for heptachlor in the pesticide/PCB blank spike samples. These pesticide/PCB spike sample problems are not expected to affect the sample results because of acceptable surrogate recoveries.

One diesel matrix spike/matrix spike duplicate sample set was analyzed, but the recoveries were not reported. This problem is not expected to affect the data because the other diesel MS/MSD has acceptable percent recovery and relative percent difference (RPD). The blank spike samples also have acceptable recoveries.

6. All quality control criteria reviewed, other than those discussed above, were met and are considered acceptable. All other results are considered valid and usable for all purposes.

## 2.0 REVIEW OF HOLDING TIMES

Page 1 of 22

## ANALYSIS AND EXTRACTION DATE/ HOLDING TIME(S)

Laboratory NET

Sample Delivery Group 9106G601

QA Reviewer/Firm TA/PRC

Review Date May 20, 1991

Sample Matrix Soil

CLP SOC

**(soil: extract 14 days**

**analyze 40 days**

**water: extract 7 days**

analyze 40 days)

### CLP Pesticides/PCBs

**(soil: extract 14 days**

**analyze 40 days**

**water: extract 7 days**

**analyze 40 days)**

CLP VOC

**Sample Number**

**Sample Date**

**(14 days for soil and water)**

## Extract

## Analyze

## Extract

## Analyze

[illegible]

\* = Holding Time exceeded

all holding times in days

## 2.1 VIEW OF HOLDING TIMES

Page 2 of 22

Laboratory NET  
Sample Delivery Group 91066601  
QA Reviewer/Firm TA/PRC  
Review Date May 20, 1991  
Sample Matrix Soil

ANALYSIS DATE/HOLDING TIME

[illegible]

**[1] -Including Molybdenum**

\* - Holding Time exceeded

**Note: all holding times in days**

## 2.2 REVIEW OF HOLDING TIMES

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Laboratory NET  
Sample Delivery Group 9106 G601  
QA Reviewer/Firm TA/PRC  
Review Date May 20, 1991  
Sample Matrix SDI

## ANALYSIS DATE/HOLDING TIME

[illegible]

\* - Holding Time exceeded  
Note: all holding times in days.

### 2.3 . . . /IEW OF HOLDING TIMES

#### non-CLP ORGANICS ANALYSES

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Laboratory NET  
Sample Delivery Group 9106 G601  
QA Reviewer/Firm TRC  
Review Date May 20, 1991  
Sample Matrix soil

## ANALYSIS AND/OR EXTRACTION DATE/HOLDING TIME

[illegible]

\* = Holding Time exceeded  
Note: all holding times in days.

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## ADJUSTED AND QUALIFIED SAMPLES

Lab. Blank Sample Number & detected analytes	Concentration (ug/l)	5 or 10x Value	(Old value/New Value)	(Old value/New Value)	(Old value/New Value)	(Old value/New Value)	(Old value/New Value)
-------------------------------------------------	-------------------------	-------------------	-----------------------	-----------------------	-----------------------	-----------------------	-----------------------

[illegible]



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Sample Matrix Soil

[illegible][illegible]

### 3.2 LABORATORY BLANK REVIEW CLP PESTICIDES/PCBs

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Laboratory NET

## ADJUSTED AND QUALIFIED SAMPLES

Sample Delivery Group 91066601

QA Reviewer/Firm TA PRC

Review Date May 20, 1991

Sample Matrix soil

9106G601  
Sample Number

9106G602  
Sample Number

9106 H 587  
Sample Number

9106 H 588  
Sample Number

9106HS89  
Sample Number

Lab. Blank Sample Number Concentration 5 or 10x  
& detected analytes (uM) Value

(Old value/New Value) (Old value/New Value) (Old value/New Value) (Old value/New Value) (Old value/New Value)

[illegible]

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## ADJUSTED AND QUALIFIED SAMPLES

Sample Matrix soil

**Sample Number**

$$\frac{\text{tough}}{\text{ug/kg}}$$

**(Old value/New Value)**

[illegible]

### 3.3 LABORATORY BLANK REVIEW CLP INORGANICS

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Laboratory NET

Sample Delivery Group 9106 G601

CA Reviewer/Firm TA PRC

Review Date Mar 20, 1991

Sample Matrix col

## QUALIFIED SAMPLES

[illegible]

[1] = laboratory blank, e.g. ICB,CCB,PB,etc.

## Page 10 of 22

### QUALIFIED SAMPLES

[illegible]

**[1] = laboratory blank, e.g. PB etc.**

# 4.0 REVIEW OF SURROGATE RECOVERIES CLP ORGANICS

Page 11 of 22

Laboratory NET  
Sample Delivery Group 9106G.601  
QA Reviewer/Firm TA/PRC  
Review Date May 20, 1991  
Sample Matrix Soil

	QC LIMIT		<u>9106G601</u>	<u>9106G602</u>	<u>9106H587</u>	<u>9106H588</u>	<u>9106H589</u>
	Water	Soil	Sample Number	Sample Number	Sample Number	Sample Number	Sample Number
<b>VOLATILES</b>			Surrogate Value	Surrogate Value	Surrogate Value	Surrogate Value	Surrogate Value
toluene-d8	88-110	81-117	113	109	97	111	105
bromofluorobenzene	86-115	74-121	76	81	89	74	83
1,2-dichloroethane-d4	76-114	70-121	84	87	98	86	85
			Qualifier	Qualifier	Qualifier	Qualifier	Qualifier
<b>SEMIVOLATILES</b>							
nitrobenzene-d5	35-114	35-114 <sup>23-120</sup>	57	69	93	56	70
2-fluorobiphenyl	43-116	43-116 <sup>30-115</sup>	70	77	113	76	87
terphenyl-d14	33-141	33-141 <sup>18-137</sup>	73	80	131	82	98
phenol-d5	10.0-94	10.0-94 <sup>24-113</sup>	59	68	94	59	73
2-fluorophenol	21-100	21-100 <sup>15-121</sup>	56	67	93	54	65
2,4,6-tribromophenol	10-123	10-123 <sup>19-122</sup>	68	74	109	70	80
			Qualifier	Qualifier	Qualifier	Qualifier	Qualifier
<b>PESTICIDES/PCBs</b>							
dibutylchloroendate	24-154	20-150	64	70	74	<del>66</del> 65	77
			Qualifier	Qualifier	Qualifier	Qualifier	Qualifier

\* - Values outside of QC limits

# 4.0 REVIEW OF SURROGATE RECOVERIES CLP ORGANICS

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Laboratory NET  
Sample Delivery Group 9106G601  
QA Reviewer/Firm TA/PRC  
Review Date May 20, 1991  
Sample Matrix Soil

	QC LIMIT		<u>9106H590</u>	<u>9106G605</u>	<u>9106G606</u>		
	Water	Soil	Sample Number	Sample Number	Sample Number	Sample Number	Sample Number
VOLATILES			Surrogate Value	Surrogate Value	Surrogate Value	Surrogate Value	Surrogate Value
toluene-d8	88-110	81-117	116	103	104		
bromofluorobenzene	86-115	74-121	74	99	103		
1,2-dichloroethane-d4	76-114	70-121	85	109	105		
			Qualifier	Qualifier	Qualifier	Qualifier	Qualifier
SEMIVOLATILES							
nitrobenzene-d5	35-114	85-114 <sup>22-120</sup>	63	91	92		
2-fluorobiphenyl	43-116	43-116 <sup>30-115</sup>	83	89	90		
terphenyl-d14	33-141	33-141 <sup>18-137</sup>	94	93	93		
phenol-d5	10.0-94	10.0-94 <sup>24-113</sup>	67	78	76		
2-fluorophenol	21-100	21-100 <sup>25-121</sup>	59	72	65		
2,4,6-tribromophenol	10-123	10-123 <sup>14-122</sup>	84	71	61		
			Qualifier	Qualifier	Qualifier	Qualifier	Qualifier
PESTICIDES/PCBs							
butylchloredate	24-154	20-150	76	170 *	130		
			Qualifier	Qualifier	Qualifier	Qualifier	Qualifier

\* = Values outside of QC limits

# 4.1 REVIEW OF SURROGATE RECOVERIES non-CLP ORGANICS

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Laboratory NET  
Sample Delivery Group 9106G601  
QA Reviewer/Firm TA/PRC  
Review Date May 20 1991  
Sample Matrix Soil

## METHOD 8010

bromochloromethane  
2-bromo-1-chloropropane  
1,4-dichlorobutane

QC LIMIT  
Water      Soil


## METHOD 8020

alpha,alpha, alpha,-  
trifluorotoluene

--	--

## TPH Gasoline

Bromofluorobenzene      50-150      50-150

9106G601    9106G602    9106H587    9106H588    9106H589  
Sample Number    Sample Number    Sample Number    Sample Number    Sample Number

Surrogate Value	Surrogate Value	Surrogate Value	Surrogate Value	Surrogate Value
Qualifier__	Qualifier__	Qualifier__	Qualifier__	Qualifier__

Qualifier__	Qualifier__	Qualifier__	Qualifier__	Qualifier__

<u>48 *</u>	<u>22 *</u>	<u>40 *</u>	<u>27 *</u>	<u>33 *</u>
Qualifier__	Qualifier__	Qualifier__	Qualifier__	Qualifier__

\* = Values outside of QC limits



# 4.1 REVIEW OF SURROGATE RECOVERIES non-CLP ORGANICS

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Laboratory NET  
Sample Delivery Group 9106G601  
QA Reviewer/Firm TA/REL  
Review Date May 20, 1991  
Sample Matrix Slit

	QC LIMIT Water	Soil
METHOD 8010		
bromochloromethane		
2-bromo-1-chloropropane		
1,4-dichlorobutane		

METHOD 8020		
alpha,alpha, alpha,- trifluorotoluene		

TPH Gasoline		
Bromofluorobenzene	50-150	50-150

<u>9106H590</u> Sample Number	<u>9106G605</u> Sample Number	<u>9106G606</u> Sample Number	<u>          </u> Sample Number	<u>          </u> Sample Number
Surrogate Value	Surrogate Value	Surrogate Value	Surrogate Value	Surrogate Value
Qualifier <u>      </u>	Qualifier <u>      </u>	Qualifier <u>      </u>	Qualifier <u>      </u>	Qualifier <u>      </u>
Qualifier <u>      </u>	Qualifier <u>      </u>	Qualifier <u>      </u>	Qualifier <u>      </u>	Qualifier <u>      </u>
Qualifier <u>      </u>	Qualifier <u>      </u>	Qualifier <u>      </u>	Qualifier <u>      </u>	Qualifier <u>      </u>
Qualifier <u>      </u>	Qualifier <u>      </u>	Qualifier <u>      </u>	Qualifier <u>      </u>	Qualifier <u>      </u>

\* = Values outside of QC limits

# 5.0 REVIEW OF MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERIES AND RPDs CLP ORGANICS

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Laboratory NET  
Sample Delivery Group 9106 G601  
QA Reviewer/Firm TH/PRC  
Review Date May 20, 1991  
Sample Matrix soil

## ADJUSTED AND QUALIFIED SAMPLES

### QC LIMITS (%R / %RPD)

Water Soil

9106 H587  
Sample Number

N/A

Sample Number

9105 H586  
Sample Number

MS %R MSD %R RPD

(-81535 / -81536)  
MS %R MSD %R RPD

MS %R MSD %R RPD

### VOLATILES (VOC)

1,1-dichloroethene	61-145/14	59-172/22
trichloroethene	71-120/14	62-137/23
benzene	76-127/11	66-142/21
toluene	76-125/13	59-139/21
chlorobenzene	75-130/13	60-133/21

			83	89	7.0			
			96	99	4.3			
			103	87	17			
			87	85	2.3			
			80	96	18			

### SEMI-VOLATILES (SOC)

phenol	12-89/42	26-90/35
2-chlorophenol	27-123/40	25-102/50
1,4-dichlorobenzene	36-97/28	28-104/27
N-nitroso-di-n-propylamine	41-116/38	41-126/38
1,2,4-trichlorobenzene	39-98/28	38-107/23
4-chloro-3-methylphenol	23-97/42	26-103/33
acenaphthene	46-118/31	31-137/19
4-nitrophenol	10-80/50	11-114/50
2,4-dinitrotoluene	24-96/38	28-89/47
pentachlorophenol	9-103/50	17-109/47
pyrene	26-127/31	35-142/36

						50	49	2.0
						39	42	7.4
						29	36	2.2
						50	49	2.0
						38	43	12
						62	56	10
						61	54	12
						75	70	6.9
						61	58	5.0
						75	68	9.8
						61	55	10

### PESTICIDES/PCBs

gamma-BHC (lindane)	56-123/15	46-127/50
heptachlor	40-131/20	35-130/31
aldrin	40-120/22	34-132/43
dieldrin	52-126/18	31-134/38
endrin	56-121/21	42-139/45
4,4'-DDT	38-127/27	23-134/50

134*	149*	10						
MI*	MT*	12						
85	98	15						
92	101	7.0						
91	102	5.0						
78	77	0						

\* = Values outside of QC limits

MI - Matrix Interference

# 5.0 REVIEW OF MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERIES AND RPDs CLP ORGANICS

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Laboratory NET  
Sample Delivery Group 9106G60D  
QA Reviewer/Firm TA/PRC  
Review Date May 20, 1991  
Sample Matrix Soil

## ADJUSTED AND QUALIFIED SAMPLES

	QC LIMITS (%R / %RPD)		9106 G605 Sample Number			9106 G606 Sample Number			9106 G604 Sample Number		
	Water	Soil	MS %R	MSD %R	RPD	MS %R	MSD %R	RPD	MS %R	MSD %R	RPD
<b>VOLATILES (VOC)</b>											
1,1-dichloroethene	61-145/14	59-172/22	88	91	3.1						
trichloroethene	71-120/14	62-137/23	88	88	1.0						
benzene	78-127/11	66-142/21	67	68	1.2						
toluene	78-125/13	59-139/21	90	94	4.3						
chlorobenzene	75-130/13	60-133/21	86	84	2.1						
<b>SEMIVOLATILES (SOC)</b>											
phenol	12-89/42	26-90/35				78	77	1.3			
2-chlorophenol	27-123/40	25-102/50				63	61	3.2			
1,4-dichlorobenzene	36-97/28	28-104/27				64	59	8.1			
N-nitroso-di-n-propylamine	41-116/38	41-126/38				80	77	3.8			
1,2,4-trichlorobenzene	39-98/28	38-107/23				72	69	4.3			
4-chloro-3-methylphenol	23-97/42	26-103/33				86	85	1.2			
acenaphthene	46-118/31	31-137/19				74	74	0.0			
4-nitrophenol	10-80/50	11-114/50				98	99	1.0			
2,4-dinitrotoluene	24-96/38	28-89/47				88	88	0.0			
pentachlorophenol	9-103/50	17-109/47				95	100	5.1			
pyrene	26-127/31	35-142/36				71	75	5.5			
<b>PESTICIDES/PCBs</b>											
gamma-BHC (lindane)	56-123/15	46-127/50							123	106	15
heptachlor	40-131/20	35-130/31							90	112	8.0
aldrin	40-120/22	34-132/43							126	140*	11
dieldrin	52-126/18	31-134/38							121	115	5.0
endrin	56-121/21	42-139/45							129	122	6.0
4,4'-DDT	38-127/27	23-134/50							131	109	18

\* = Values outside of QC limits

# 5.1 REVIEW OF MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERIES AND RPDs NON-CLP ANALYTES

Page 17 of 22

Laboratory NET  
Sample Delivery Group 9106G601  
QA Reviewer/Firm TA/PRC  
Review Date May 20, 1991  
Sample Matrix Soil

			<u>NA</u>			ADJUSTED AND QUALIFIED SAMPLES			<u>9106H588</u>			<u>9106G605</u>		
			Sample Number			Sample Number			Sample Number			Sample Number		
			QC LIMITS (%R / %RPD)											
			Water	Soil		MS %R	MSD %R	RPD	MS %R	MSD %R	RPD	MS %R	MSD %R	RPD
METHOD 8010														
1,1-dichloroethene	61-145/14	59-172/22												
chloroform														
bromodichloromethane														
trichloroethene	71-120/14	62-137/24												
tetrachloroethene														
chlorobenzene	75-130/13	60-133/21												
METHOD 8020														
toluene	78-125/13	59-139/21												
benzene	78-127/11	68-142/21												
						(-81602/-81603)								
TPH Diesel	50-150/50	50-150/50										63	57	11
TPH Gasoline	50-150/50	50-150/50				103	100	4.3						
Oil and Grease	85-115/30	85-115/30							93.8	99.6	2.0	106	103	3.7
Chloride	50-150/50	50-150/50												
Nitrate	50-150/50	50-150/50												
Sulfate	50-150/50	50-150/50												
Orthophosphate	50-150/50	50-150/50												
Chromium VI	70-130/30	70-130/40												
Total Dissolved Solids	70-130/15	NA												

\* = Values outside of QC limits

Diesel MS/MSD (-81607/-81608) was run, but recoveries were N/A

# 5.1 REVIEW OF MATRIX SPIKE/MATRIX SPIKE DUPLICATE F OVERIES AND RPDs NON-P ANALYTES

Page 18 of 22

Laboratory NET  
Sample Delivery Group 9106601  
QA Reviewer/Firm TA/PRC  
Review Date May 20, 1991  
Sample Matrix Soil

## ADJUSTED AND QUALIFIED SAMPLES

	QC LIMITS (%R / %RPD)		N/A Sample Number			Sample Number			Sample Number		
	Water	Soil	MS %R	MSD %R	RPD	MS %R	MSD %R	RPD	MS %R	MSD %R	RPD
<b>METHOD 8010</b>											
1,1-dichloroethene	61-145/14	59-172/22									
chloroform											
bromodochloromethane											
trichloroethene	71-120/14	62-137/24									
tetrachloroethene											
chlorobenzene	75-130/13	60-133/21									
<b>METHOD 8020</b>											
toluene	76-125/13	59-139/21									
benzene	76-127/11	66-142/21									
			(-81724   -81725)								
TPH Diesel	50-150/50	50-150/50									
TPH Gasoline	50-150/50	50-150/50	83	85	2.3						
Oil and Grease	85-115/30	85-115/30									
Chloride	50-150/50	50-150/50									
Nitrate	50-150/50	50-150/50									
Sulfate	50-150/50	50-150/50									
o-Phosphate	50-150/50	50-150/50									
Chromium VI	70-130/30	70-130/40									
Total Dissolved Solids	70-130/15	NA									

\* = Values outside of QC limits

## 6.0 REVIEW OF MATRIX DUPLICATES

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Laboratory NET  
Sample Delivery Group 9106 G601  
QA Reviewer/Firm TA/PRC  
Review Date ~~TA/PRC~~ May 20, 1991  
Sample Matrix Soil

### QUALIFIED ASSOCIATED SAMPLES

**SAMPLE NUMBER**

9105 H585

**DUPLICATE SAMPLE NUMBER**

- 84433

**Sample Number   Sample Number   Sample Number   Sample Number   Sample Number**

## METHOD AND ANALYTE

**SAMPLE  
VALUE**

**DUPLICATE  
VALUE**

**%RPD**

### Qualifier

### Qualifier

### Qualifier

**Qualifier**

### Qualifier

(List analytes that do not meet criteria)

[illegible]

\* = RPD exceeds QAPP limit.

\* = RPD exceed Functional Guideline limit (CLP inorganics only)

## 7.0 REVIEW OF BLANK SPIKES

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Laboratory NET  
Sample Delivery Group 9106G601  
QA Reviewer/Firm TR/PRC  
Review Date May 20, 1991  
Sample Matrix gell  
Lab Sample Number \_\_\_\_\_

### QUALIFIED ASSOCIATED SAMPLES

9106G601, 602, 9106H587 through 9106H 590, 9106G605, 9106G606  
Sample Number Sample Number Sample Number Sample Number Sample Number

[illegible]

**T=total concentration found in spiked sample.**

**A=actual spike concentration added to sample.**

\* - exceeds QAPP limit

# = exceeds Functional Guideline Limit

MI - Matrix Interference

## 8.0 REVIEW OF MATRIX SPIKES CLP INORGANICS

Page 21 of 22

Laboratory NET  
Sample Delivery Group 9106G601  
QA Reviewer/Firm TA/PRC  
Review Date May 20, 1991  
Sample Matrix Soil

### QUALIFIED ASSOCIATED SAMPLES

<u>9106G601</u>	<u>9106G602</u>	<u>9106H587</u>	<u>9106H588</u>	<u>9106H589</u>
Sample Number	Sample Number	Sample Number	Sample Number	Sample Number

**SAMPLE NUMBER**  
**& analytes outside of QC limits**

**% R**

## IDL

Value/Qualifier

**Value/Qualifier****Value/Qualifier**

Value/Qualifier

**Value/Qualifier**[illegible]



## 8.0 REVIEW OF MATRIX SPIKES

### CLP INORGANICS

Page 22 of 22

Laboratory NET  
Sample Delivery Group 9106 GG01  
QA Reviewer/Firm TA/ERC  
Review Date May 20, 1991  
Sample Matrix soil

### QUALIFIED ASSOCIATED SAMPLES

9106 H590  
Sample Number

9106G605  
Sample Number

9106G606  
Sample Number

**Sample Number**

**Sample Number**

**SAMPLE NUMBER**  
**& analytes outside of QC limits**

**% R**

## IDL

**Value/Qualifier**

Value/Qualifier

**Value/Qualifier****Value/Qualifier****Value/Qualifier**[illegible]

## QA/QC DATA REVIEW SUMMARY

### 1.0 QA/QC NARRATIVE

Site: Hunters Point Annex (CTO 0106)  
Laboratory: NET Pacific, Inc.  
QA Reviewer: Ashish Goel, PRC  
Review Date: May 24, 1991

Batch No.: 9107X054 (NET Log No. 6090)  
Sample No.: 9107X054 through 9107X057  
Analyses: Volatiles, semi-volatiles, pesticides/PCBs, metals (including mercury and molybdenum), TPH diesel, TPH gasoline, oil and grease, cyanide, and pH

Collection Date: February 12, 1991  
QC Criteria Reviewed: Holding time, laboratory blanks, surrogate recoveries, matrix spike/matrix spike duplicate, matrix duplicate and blank spike

The data were reviewed according to EPA documents "Laboratory Data Validation Functional Guidelines for Evaluating Organic Analyses" (February 1988) and "Laboratory Data Validation Functional Guidelines for Evaluating Inorganic Analyses" (July 1988).

#### Comments

1. Due to accuracy problems, the results for the following analytes are considered estimates (J) and usable for limited purposes only.

- Thallium in samples 9107X054, 9107X055, and 9107X057

The matrix spike recovery for thallium was 68.2% (75-125% QC limit). The sample results are biased low for thallium.

The matrix spike and blank spike recoveries for selenium were above the QC acceptance limits, but the samples were not qualified because the sample results were non-detected.

2. Due to precision problems, the results for the following analytes are considered estimates (J) and usable for limited purposes only.

- Antimony and zinc in samples 9107X054, 9107X055, and 9107X057

The relative percent difference of zinc was 13% (20% QC limit) in the matrix duplicate sample. The antimony result for the duplicate sample was 135.6  $\mu\text{g/L}$ , but antimony was undetected in the original sample analysis. The difference is greater than the CRDL.

3. Methylene chloride and acetone were detected in two laboratory blanks for volatiles at concentrations of 3.6  $\mu\text{g/L}$  and 6.3  $\mu\text{g/L}$ , respectively (the same values in both blanks). However, these contaminants were not detected in any of the samples and the results are not affected.

4. The seven day holding time for TPH gasoline analysis was exceeded by two days.

- The gasoline results of samples 9107X054, 9107X055, and 9107X057 are considered estimated (J) and usable for limited purposes.

No other holding times were exceeded.

5. Percent recoveries were reported outside the QC limits for the pesticide/PCB matrix spike duplicate sample: 146% for gamma-BHC, 122% for aldrin, 149% for dieldrin, 142% for endrin, and 146% for 4,4'-DDT. The QC limits for the relative percent difference (RPD) were exceeded for gamma-BHC, dieldrin, endrin, and 4,4'-DDT.

The percent recovery for the semivolatile matrix spike duplicate for 4-nitrophenol was reported as 89% (QC limits 10-80%). The percent recovery of benzene was 73% and 72% in the volatile matrix spike/matrix spike duplicate samples.

These problems do not affect the data because they marginally exceed criteria and the surrogate recoveries are acceptable.

6. The quality control criteria reviewed, other than those discussed above, were met and are considered acceptable. All other results are considered valid and usable for all purposes.

## 2.0 REVIEW OF HOLDING TIMES

### ORGANIC CLP ANALYSES

Page 1 of 16

## ANALYSIS AND EXTRACTION DATE/ HOLDING TIME(S)

Laboratory NET

Sample Delivery Group 9107 X054

QA Reviewer/Firm PRC

Review Date 5-22-91

Sample Matrix WATER

CLP SOC

(soil: extract 14 days

analyze 40 days

**water: extract 7 days**

analyze 40 days)

### CLP Pesticides/PCBs

(soil: extract 14 days

**analyze 40 days**

**water: extract 7 days**

analyze 40 days)

CLP VOC

**(14 days for soil and water)**

## Extract

## Analyze

## Extract

## Analyze

[illegible]

\* = Holding Time exceeded

**Note: all holding times in days**

**2.1 REVIEW OF HOLDING TIMES  
INORGANIC CLP ANALYSES**

Page 2 of 16

Laboratory NET

Sample Delivery Group 9107 X 054

QA Reviewer/Firm PRC

Review Date 5-22-91

Sample Matrix Water

ANALYSIS DATE/HOLDING TIME

Sample Number	Sample Date	CLP Metals[1] (6 months)	CLP Mercury (28 days)	CLP Cyanide (14 days)
9107 X 054	2-12-91	3-13-91 → 3-17-91	2-22-91	2-22-91
9107 X 055	2-12-91	3-13-91 → 3-17-91	2-22-91	2-22-91
9107 X 056	2-12-91	NA	NA	NA
9107 X 057	2-12-91	3-13-91 → 3-17-91	2-22-91	2-22-91

[1] - Including Molybdenum

\* - Holding Time exceeded

Note: all holding times in days

## 2.2 REVIEW OF HOLDING TIMES

### non-CLP INORGANICS ANALYSES

Page 3 of 16

Laboratory NET  
Sample Delivery Group 9107 X 054  
QA Reviewer/Firm PRC  
Review Date 5-22-91  
Sample Matrix Water

ANALYSIS DATE/HOLDING TIME

**Chromium VI**  
soil: 7 days for extract;  
24 hours analysis  
water: 24 hour analysis

[illegible]

\* - Holding Time exceeded  
Note: all holding times in days.

Page 4 of 16

Sample Matrix Water

## TPH, Diesel

**Oil and Grease  
(28 days)**

\* - Holding Time exceeded  
Note: all holding times in days.

### 3.0 LABORATORY BLANK REVIEW CLP VOC

Page 5 of 16

Laboratory NET

Sample Delivery Group 9107X054

QA Reviewer/Firm PRC

Review Date 5-22-91

Sample Matrix Water

### ADJUSTED AND QUALIFIED SAMPLES

[illegible]



### 3.1 LABORATORY BLANK REVIEW

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Laboratory NET

Sample Delivery Group 9107 X054

QA Reviewer/Firm PRC

Review Date 5-23-91

Sample Matrix Water

## ADJUSTED AND QUALIFIED SAMPLES

[illegible]

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## ADJUSTED AND QUALIFIED SAMPLES

Sample Matrix Water

**Sample Number**

(Old value/New Value)

[illegible]

### 3.3 LABORATORY BLANK REVIEW CLP INORGANICS

Page 8 of 16Laboratory NET

Sample Delivery Group 9107 X054

QA Reviewer/Firm PRC

Review Date 5-23-91

Sample Matrix Water

## QUALIFIED SAMPLES

[illegible]

**[1] = laboratory blank, e.g. ICB,CCB,PB,etc.**

### 3.4 LABORATORY BLANK REVIEW NON-CLP ANALYTES

Page 9 of 16

Laboratory NET  
Sample Delivery Group 9107 X054  
QA Reviewer/Firm PRC  
Review Date 5-23-91  
Sample Matrix Water

### QUALIFIED SAMPLES

[illegible]

**[1] = laboratory blank, e.g. PB etc.**

# 4.0 REVIEW OF SURROGATE RECOVERIES CLP ORGANICS

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Laboratory NET  
Sample Delivery Group 9107 X054  
QA Reviewer/Firm PRC  
Review Date 5-23-91  
Sample Matrix Water

	QC LIMIT	
	Water	Soil
<b>VOLATILES</b>		
toluene-d8	88-110	81-117
bromofluorobenzene	86-115	74-121
1,2-dichloroethane-d4	76-114	70-121

<u>9107 X054</u>	<u>9107 X055</u>	<u>9107 X056</u>	<u>9107 X057</u>	
Sample Number	Sample Number	Sample Number	Sample Number	Sample Number
Surrogate Value	Surrogate Value	Surrogate Value	Surrogate Value	Surrogate Value
98	94	100	103	
103	103	95	104	
103	103	85	113	
Qualifier	Qualifier	Qualifier	Qualifier	Qualifier

<b>SEMIVOLATILES</b>		
nitrobenzene-d5	35-114	35-114 23-120
2-fluorobiphenyl	43-116	43-116 30-115
terphenyl-d14	33-141	33-141 18-137
phenol-d5	10.0-94	10.0-94 14-113
2-fluorophenol	21-100	21-100 25-121
2,4,6-tribromophenol	10-123	10-123 19-122

67	72	NA	75	
81	77		82	
57	78		73	
39	54		65	
16 *	54		68	
25	51		83	
Qualifier	Qualifier	Qualifier	Qualifier	Qualifier

<b>PESTICIDES/PCBs</b>		
dibutylchloroendate	24-154	20-150

36	65	NA	50	
Qualifier	Qualifier	Qualifier	Qualifier	Qualifier

\* = Values outside of QC limits

# 4.1 REVIEW OF SURROGATE RECOVERIES non-CLP ORGANICS

Page 11 of 16

Laboratory NET  
Sample Delivery Group 9107 X054  
QA Reviewer/Firm PRC  
Review Date 5-23-91  
Sample Matrix Water

	QC LIMIT		<u>9107 X054</u>	<u>9107 X055</u>	<u>9107 X057</u>		
	Water	Soil	Sample Number	Sample Number	Sample Number	Sample Number	Sample Number
METHOD 8010			Surrogate Value	Surrogate Value	Surrogate Value	Surrogate Value	Surrogate Value
bromochloromethane							
2-bromo-1-chloropropane							
1,4-dichlorobutane							
			Qualifier__	Qualifier__	Qualifier__	Qualifier__	Qualifier__
METHOD 8020							
alpha,alpha, alpha,-			Qualifier__	Qualifier__	Qualifier__	Qualifier__	Qualifier__
trifluorotoluene							
			Qualifier__	Qualifier__	Qualifier__	Qualifier__	Qualifier__
TPH Gasoline							
Bromofluorobenzene	50-150	50-150	<u>82</u>	<u>91</u>	<u>83</u>		
			Qualifier__	Qualifier__	Qualifier__	Qualifier__	Qualifier__

\* = Values outside of QC limits

# 5.0 REVIEW OF MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERIES AND RPDs CLP ORGANICS

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Laboratory NET  
Sample Delivery Group 9107 X054  
QA Reviewer/Firm PRC  
Review Date 5-23-91  
Sample Matrix Water

## ADJUSTED AND QUALIFIED SAMPLES

	QC LIMITS (%R / %RPD)		Lab Sample No. <u>-81797</u> Sample Number			Lab Sample No. <u>-81857</u> Sample Number			<u>9107 X057</u> Sample Number		
	Water	Soil	MS %R	MSD %R	RPD	MS %R	MSD %R	RPD	MS %R	MSD %R	RPD
<b>VOLATILES (VOC)</b>											
1,1-dichloroethene	61-145/14	59-172/22				90	95	4.8	89	86	3.9
trichloroethene	71-120/14	62-137/23				88	93	5.7	93	87	6.8
benzene	76-127/11	66-142/21				73 *	72 *	1.4	76	78	2.9
toluene	78-125/13	59-139/21				88	91	4.2	90	88	1.6
chlorobenzene	75-130/13	60-133/21				83	83	<1	95	90	4.5
<b>SEMIVOLATILES (SOC)</b>											
phenol	12-89/42	26-90/35							69	78	12
2-chlorophenol	27-123/40	25-102/50							59	70	17
1,4-dichlorobenzene	36-97/28	28-104/27							66	71	7.3
N-nitroso-di-n-propylamine	41-116/38	41-126/38							57	63	10
1,2,4-trichlorobenzene	39-98/28	38-107/23							71	76	6.8
4-chloro-3-methylphenol	23-97/42	26-103/33							74	79	6.5
acenaphthene	46-118/31	31-137/19							76	79	3.9
4-nitrophenol	10-80/50	11-114/50							75	89 *	17
2,4-dinitrotoluene	24-96/38	28-89/47							63	68	7.6
pentachlorophenol	9-103/50	17-109/47							80	83	3.7
pyrene	26-127/31	35-142/36							75	69	8.3
<b>PESTICIDES/PCBs</b>											
gamma-BHC (lindane)	56-123/15	46-127/50	122	146 *	18 *						
heptachlor	40-131/20	35-130/31	90	102	13						
aldrin	40-120/22	34-132/43	112	122 *	9						
dieldrin	52-126/18	31-134/38	121	149 *	21 *						
endrin	56-121/21	42-139/45	111	142 *	25 *						
4,4'-DDT	38-127/27	23-134/50	101	146 *	36 *						

\* = Values outside of QC limits

# 5.1 REVIEW OF MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERIES AND RPDs NON-CLP ANALYTES

Page 13 of 16

Laboratory NET  
Sample Delivery Group 9107 X054  
QA Reviewer/Firm PRC  
Review Date 5-23-91  
Sample Matrix Water

			9107 X057			ADJUSTED AND QUALIFIED SAMPLES			Lab Blank No. -81874		
			Sample Number			Sample Number			Sample Number		
			QC LIMITS (%R / %RPD)								
			Water	Soil		MS %R	MSD %R	RPD	MS %R	MSD %R	RPD
<b>METHOD 8010</b>											
1,1-dichloroethene	61-145/14	59-172/22									
chloroform											
bromodochloromethane											
trichloroethene	71-120/14	62-137/24									
tetrachloroethene											
chlorobenzene	75-130/13	60-133/21									
<b>METHOD 8020</b>											
toluene	76-125/13	59-139/21									
benzene	76-127/11	66-142/21									
TPH Diesel	50-150/50	50-150/50							90	87	1.9
TPH Gasoline	50-150/50	50-150/50				110	112	1.8			
Oil and Grease	85-115/30	85-115/30				91	94	3.2			
Chloride	50-150/50	50-150/50									
Nitrate	50-150/50	50-150/50									
Sulfate	50-150/50	50-150/50									
o-Phosphate	50-150/50	50-150/50									
Chromium VI	70-130/30	70-130/40									
Total Dissolved Solids	70-130/15	NA									

\* = Values outside of QC limits



## 6.0 REVIEW OF MATRIX DUPLICATES

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Laboratory NET  
Sample Delivery Group 9107 X054  
QA Reviewer/Firm PRC  
Review Date 5-23-91  
Sample Matrix Water

### QUALIFIED ASSOCIATED SAMPLES

SAMPLE NUMBER	9107X057
DUPLICATE SAMPLE NUMBER	Lab No. - 81794 (DUPLICATE)

9007X054   9107X055   9107X057   \_\_\_\_\_   \_\_\_\_\_  
Sample Number   Sample Number   Sample Number   Sample Number   Sample Number

[illegible]

\* - RPD exceeds QAPP limit.

# = RPD exceed Functional Guideline limit (CLP inorganics only)

## 7.0 REVIEW OF BLANK SPIKES

Page 15 of 16Laboratory NET

Sample Delivery Group 9107X054

QA Reviewer/Firm PRC

Review Date 5-23-91

Sample Matrix Water

Lab Sample Number (SEE BELOW)

### QUALIFIED ASSOCIATED SAMPLES

Sample Number	Sample Number	Sample Number	Sample Number	Sample Number
---------------	---------------	---------------	---------------	---------------

[illegible]

**T=total concentration found in spiked sample.**

**A=actual spike concentration added to sample.**

\* = exceeds QAPP limit

# = exceeds Functional Guideline Limit

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### QUALIFIED ASSOCIATED SAMPLES

**SAMPLE NUMBER**  
**& analytes outside of QC limits**

**% R**

IDL  
(mg/L)

Value/Qualifier

**Value/Qualifier**

Value/Qualifier

**Value/Qualifier****Value/Qualifier**[illegible]

## QA/QC DATA REVIEW SUMMARY

### 1.0 QA/QC Narrative

Site: Hunters Point Annex (CTO 0106)  
Laboratory: NET Pacific, Inc.  
QA Reviewer: Christina Kabitzke and Thorsten Anderson, PRC  
Review Date: May 22, 1991

Batch No.: 9107X050 (NET Log No. 6065)  
Sample No.: 9107X050 through 9107X053  
Analyses: Volatiles, semi-volatiles, pesticides/PCBs, metals (including molybdenum), cyanide, TPH diesel, TPH gasoline, oil and grease, and pH

Collection Date: February 11, 1991  
QC Criteria Reviewed: Holding time, laboratory blanks, surrogate recoveries, matrix spike/matrix spike duplicate, matrix duplicate and blind spike

The data were reviewed according to EPA documents "Laboratory Data Validation Functional Guidelines for Evaluating Organic Analyses" (February 1988) and "Laboratory Data Validation Functional Guidelines for Evaluating Inorganic Analyses" (July 1988).

#### Comments

1. Due to blank contamination problems, the result for the following analyte is considered non-detected and estimated (UJ) and usable for limited purposes only.

- Methylene chloride in sample 9107X051

Methylene chloride and acetone were found in the volatile laboratory blank at concentrations of 3.5 µg/L and 6.3 µg/L, respectively. No acetone results were qualified because it was not detected in the samples. The quantitation limits for sample 9107X051 was raised according to the blank qualification rules.

2. Due to accuracy problems, the results for the following analyte are considered estimates (J) and usable for limited purposes only.

- Thallium in samples 9107X050, 9107X051, and 9107X053

The matrix spike recovery for thallium was 68.2% (75-125% QC limit). The sample results are biased low for thallium.

The matrix spike and blank spike recoveries for selenium were above the QC acceptance limits, but the samples were not qualified because the sample results were non-detected.

3. Due to precision problems, the results for the following analytes are considered estimates (J) and usable for limited purposes only.

- Antimony and zinc in samples 9107X050, 9107X051, and 9107X053

The relative percent differences of antimony and zinc were 126% and 113% (20% QC limit) in the matrix duplicate sample.

4. The following problems were observed with the matrix spike/matrix spike duplicate (MS/MSD) samples.

- Low recovery of 73% and 72% for benzene in the volatile MS/MSD samples
- Low recovery of 8-37% and poor relative percent difference (RPD) for 1,4-dichlorobenzene, N-nitroso-di-n-propylamine, and 1,2,4-trichlorobenzene in the semi-volatile MS sample
- High recovery of 93% and 89% (10-80% QC limit) for 4-nitrophenol in the semi-volatile MS/MSD samples
- High percent recoveries of 122-149% and poor RPD for gamma-BHC, aldrin, dieldrin, endrin, and 4,4'-DDT in the pesticide/PCB MSD sample

These MS/MSD problems are not expected to affect the sample results because of acceptable surrogate results.

5. Technical holding times were met for all analyses except TPH gasoline, which was exceeded by 3 days.
  - All TPH gasoline results in samples 9107X050, 9107X051, and 9107X053 are considered estimated (J) and usable for limited purposes.

No other holding times were exceeded.

6. All quality control criteria reviewed, other than those discussed above, were met and are considered acceptable. All other results are considered valid and usable for all purposes.

NET Log #61

Laboratory NET  
Sample Delivery Group 9107X050  
QA Reviewer/Firm TA/PRC  
Review Date 5-22-91  
Sample Matrix Water

**CLP SOC**  
(soil: extract 14 days  
analyze 40 days  
water: extract 7 days  
analyze 40 days)

**CLP Pesticides/PCBs**  
(soil: extract 14 days  
analyze 40 days  
water: extract 7 days  
analyze 40 days)

[illegible]

**Note: all holding times in days**

Page 2 of 16

Sample Matrix Water

ANALYSIS DATE/HOLDING TIME

[illegible]

**Note: all holding times in days**

## 2.2 REVIEW OF HOLDING TIMES

### non-CLP INORGANICS ANALYSES

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Laboratory NET

Sample Delivery Group 9107x050

QA Reviewer/Firm TA/PRC

Review Date 5-22-91

Sample Matrix Water

ANALYSIS DATE/HOLDING TIME

**Chromium VI**  
**soil: 7 days for extract;**  
**24 hours analysis**  
**water: 24 hour analysis**

[illegible]

\* - Holding Time exceeded  
Note: all holding times in days.



## Page 4 of 16

Sample Matrix Water

[illegible]

**\* - Holding Time exceeded**  
**Note: all holding times in days.**

## Page 5 of 16

## ADJUSTED AND QUALIFIED SAMPLES

Lab. Blank Sample Number & detected analytes	Concentration (ug/l)	5 or 10x Value	Sample Number: (Old value/New Value)	Sample Number: (Old value/New Value)	Sample Number: (Old value/New Value)	Sample Number: (Old value/New Value)	Sample Number: (Old value/New Value)
-------------------------------------------------	-------------------------	-------------------	-----------------------------------------	-----------------------------------------	-----------------------------------------	-----------------------------------------	-----------------------------------------

[illegible]

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## ADJUSTED AND QUALIFIED SAMPLES

[illegible]

### 3.2 LABORATORY BLANK REVIEW CLP PESTICIDES/PCBs

Page 7 of 16

Laboratory NET  
Sample Delivery Group 9107X050  
QA Reviewer/Firm TA/PRC  
Review Date 5-22-91  
Sample Matrix Water

## ADJUSTED AND QUALIFIED SAMPLES

Lab. Blank	Sample Number	Concentration	5 or 10x	Sample Number	Sample Number	Sample Number	Sample Number	Sample Number
& detected analytes		(ug/l)	Value	(Old value/New Value)	(Old value/New Value)	(Old value/New Value)	(Old value/New Value)	(Old value/New Value)

[illegible]

## Page 8 of 16

## QUALIFIED SAMPLES

[illegible]

**[1] = laboratory blank, e.g. ICB,CCB,PB,etc.**

### 3.4 LABORATORY BLANK REVIEW NON-CLP ANALYTES

Page 7 of 16

Laboratory NET  
Sample Delivery Group 9107XOSP  
QA Reviewer/Firm TA/PRC  
Review Date 5-22-91  
Sample Matrix Water

## QUALIFIED SAMPLES

[illegible]

**[1] = laboratory blank, e.g. PB etc.**

# 4.0 VIEW OF SURROGATE RECOVERIES CLP ORGANICS

Page 10 of 16

Laboratory NET  
Sample Delivery Group 9107X050  
QA Reviewer/Firm TA/PRC  
Review Date 5-22-91  
Sample Matrix Water

**VOLATILES**

	QC LIMIT Water	Soil
toluene-d8	88-110	81-117
bromofluorobenzene	86-115	74-121
1,2-dichloroethane-d4	76-114	70-121

<u>9107X050</u>	<u>9107X051</u>	<u>9107X053</u>	<u>9107X052</u>	
Sample Number	Sample Number	Sample Number	Sample Number	Sample Number
Surrogate Value	Surrogate Value	Surrogate Value	Surrogate Value	Surrogate Value
99	104	100	104	
97	95	98	100	
107	105	93	108	
Qualifier	Qualifier	Qualifier	Qualifier	Qualifier

**SEMIVOLATILES**

nitrobenzene-d5	35-114	35-114 23-120
2-fluorobiphenyl	43-116	43-116 30-115
terphenyl-d14	33-141	33-141 18-137
phenol-d5	10.0-94	10.0-94 24-113
2-fluorophenol	21-100	21-100 25-121
2,4,6-tribromophenol	10-123	10-123 19-122

77	60	73		
81	70	79		
82	74	78		
58	39	61		
46	18 *	48		
68	14	68		
Qualifier	Qualifier	Qualifier	Qualifier	Qualifier

**PESTICIDES/PCBs**

dibutylchlorodate	24-154	20-150
-------------------	--------	--------

44	52	97		
Qualifier	Qualifier	Qualifier	Qualifier	Qualifier

\* = Values outside of QC limits

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Laboratory NET  
Sample Delivery Group 9107X050  
QA Reviewer/Firm TA/PRC  
Review Date 5-22-91  
Sample Matrix Water

**METHOD 8010**  
**bromochloromethane**  
**2-bromo-1-chloropropane**  
**1,4-dichlorobutane**

**METHOD 8020**  
**alpha,alpha, alpha,-**  
**trifluorotoluene**

<b>Bromofluorobenzene</b>	<b>50-150</b>	<b>50-150</b>
---------------------------	---------------	---------------

9107X050      9107X051      9107X053      9107X052      \_\_\_\_\_  
Sample Number      Sample Number      Sample Number      Sample Number      Sample Number

Surrogate Value	Surrogate Value	Surrogate Value	Surrogate Value	Surrogate Value
-----------------	-----------------	-----------------	-----------------	-----------------

Qualifier      Qualifier      Qualifier      Qualifier      Qualifier

Qualifier	Qualifier	Qualifier	Qualifier	Qualifier
-----------	-----------	-----------	-----------	-----------

93	84	89	<del>XXXX</del>	
Qualifier	Qualifier	Qualifier	Qualifier	Qualifier

\* = Values outside of QC limits



# 5.0 REVIEW OF MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERIES AND RPDs CLP ORGANICS

Page 12 of 16

Laboratory NET  
Sample Delivery Group 9107 X050  
QA Reviewer/Firm TA/PRC  
Review Date 5-22-91  
Sample Matrix Water

## ADJUSTED AND QUALIFIED SAMPLES

	QC LIMITS (%R / %RPD)			Sample Number			Sample Number			Sample Number		
	Water	Soil		-81810	-81811	-81812	-81857	-81858	-81859			
VOLATILES (VOC)				MS %R	MSD %R	RPD	MS %R	MSD %R	RPD	MS %R	MSD %R	RPD
1,1-dichloroethene	61-145/14	59-172/22		89	86	3.9	90	95	4.8			
trichloroethene	71-120/14	62-137/23		93	87	6.8	88	93	5.7			
benzene	76-127/11	66-142/21		76	78	2.9	73*	72*	1.4			
toluene	76-125/13	59-139/21		90	88	1.6	88	91	4.2			
chlorobenzene	75-130/13	60-133/21		95	90	4.5	83	83	2.1			
SEMIVOLATILES (SOC)												
phenol	12-89/42	26-90/35		53	68	25						
2-chlorophenol	27-123/40	25-102/50		62	73	16						
1,4-dichlorobenzene	36-97/28	28-104/27		8*	73	160*						
N-nitroso-di-n-propylamine	41-116/38	41-126/38		37*	76	69*						
1,2,4-trichlorobenzene	39-98/28	38-107/23		22*	78	112*						
4-chloro-3-methylphenol	23-97/42	26-103/33		71	80	12						
acenaphthene	46-118/31	31-137/19		67	82	20*						
4-nitrophenol	10-80/50	11-114/50		93*	89*	5						
2,4-dinitrotoluene	24-96/38	28-89/47		79	81	2						
pentachlorophenol	9-103/50	17-109/47		98	95	3						
pyrene	26-127/31	35-142/36		72	74	3						
PESTICIDES/PCBs												
gamma-BHC (lindane)	56-123/15	46-127/50		122	146*	18*						
heptachlor	40-131/20	35-130/31		90	108	13						
aldrin	40-120/22	34-132/43		112	123*	9.0						
dieldrin	52-126/18	31-134/38		121	149*	21*						
endrin	56-121/21	42-139/45		111	143*	25*						
4,4'-DDT	38-127/27	23-134/50		101	146*	36*						

\* = Values outside of QC limits

# 5.1 REVIEW OF MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERIES AND RPDs NON-CLP ANALYTES

Page 13 of 16

Laboratory NET  
Sample Delivery Group 9107X050  
QA Reviewer/Firm JA/DRC  
Review Date 5-22-91  
Sample Matrix water

## ADJUSTED AND QUALIFIED SAMPLES

	QC LIMITS (%R / %RPD)		<u>9107X057</u> Sample Number			Sample Number			Sample Number		
	Water	Soil	MS %R	MSD %R	RPD	MS %R	MSD %R	RPD	MS %R	MSD %R	RPD
<b>METHOD 8010</b>											
1,1-dichloroethene	61-145/14	59-172/22									
chloroform											
bromodochloromethane											
trichloroethene	71-120/14	62-137/24									
tetrachloroethene											
chlorobenzene	75-130/13	60-133/21									
<b>METHOD 8020</b>											
toluene	76-125/13	59-139/21									
benzene	76-127/11	66-142/21									
TPH Diesel	50-150/50	50-150/50	90	87	1.9						
TPH Gasoline	50-150/50	50-150/50	110	112	1.8						
Oil and Grease	85-115/30	85-115/30	91	94	3.2						
Chloride	50-150/50	50-150/50									
Nitrate	50-150/50	50-150/50									
Sulfate	50-150/50	50-150/50									
o-Phosphate	50-150/50	50-150/50									
Chromium VI	70-130/30	70-130/40									
Total Dissolved Solids	70-130/15	NA									

\* = Values outside of QC limits

## 6.0 REVIEW OF MATRIX DUPLICATES

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Laboratory NET  
 Sample Delivery Group 9107X050  
 QA Reviewer/Firm TA/PRC  
 Review Date 3-22-91  
 Sample Matrix Water

## QUALIFIED ASSOCIATED SAMPLES

SAMPLE NUMBER   
 DUPLICATE SAMPLE NUMBER

9105X050 905X051 9105X053 \_\_\_\_\_  
 Sample Number Sample Number Sample Number Sample Number Sample Number

METHOD AND ANALYTE (List analytes that do not meet criteria)	SAMPLE VALUE	DUPLICATE VALUE Avg.	%RPD	Qualifier	Qualifier	Qualifier	Qualifier	Qualifier
-81825		0						
PRC Sample #9106H598								
cyanide	Limits	Not Exceeded						
-81794								
PRC Sample #9107X057								
Metals								
Antimony	25 u	67.8	126	J	J	J		
Zinc	29.0	18.6	113	J	J	J		

\* = RPD exceeds QAPP limit.

# = RPD exceed Functional Guideline limit (CLP inorganics only)

## Page 15 of 16

### QUALIFIED ASSOCIATED SAMPLES

9107X050 9107X051 9107X053 \_\_\_\_\_  
Sample Number Sample Number Sample Number Sample Number Sample Number

[illegible]

T=total concentration found in spiked sample.  
A=actual spike concentration added to sample.  
\* = exceeds QAPP limit  
# = exceeds Functional Guideline Limit

## 8.0 REVIEW OF MATRIX SPIKES

### CLP INORGANICS

Page 16 of 16

Laboratory NET  
Sample Delivery Group 9107 X050  
QA Reviewer/Firm TA/PRC  
Review Date 5-22-91  
Sample Matrix Water

### QUALIFIED ASSOCIATED SAMPLES

9107X050  
Sample Number

9107X051  
Sample Number

9107X053  
Sample Number

**Sample Number**

Sample Number

**SAMPLE NUMBER**  
**& analytes outside of QC limits**

**% R**

**IDL**

Value/Qualifier

Value/Qualifier

**Value/Qualifier****Value/Qualifier**

Value/Qualifier

[illegible]

## QA/QC DATA REVIEW SUMMARY

### 1.0 QA/QC Narrative

Site: Hunters Point Annex (CTO 0106)  
Laboratory: National Environmental Testing, Inc. (NET Pacific)  
QA Reviewer: Mary E. Serra, PRC  
Review Date: May 23, 1991

Batch No.: 9107X058 (NET Log No. 6116)  
Sample No.: 9107X058 through 9107X062  
Analyses: Volatiles, semi-volatiles, pesticides/PCBs, metals (including mercury and molybdenum), cyanide, TPH diesel, TPH gasoline, oil and grease, and pH

Collection Date: February 14, 1991  
QC Criteria Reviewed: Holding time, laboratory blanks, surrogate recoveries, matrix spike/matrix spike duplicate, matrix duplicate and blank spike

The data were reviewed according to EPA documents "Laboratory Data Validation Functional Guidelines for Evaluating Organic Analyses" (February 1988) and "Laboratory Data Validation Functional Guidelines for Evaluating Inorganic Analyses" (July 1988).

### Comments

1. Due to holding time problems, the results for the following analyte are considered estimated (J) and usable for limited purposes only.

- TPH gasoline in samples 9107X058 through 9107X061
- Cyanide in sample 9107X061

The seven day holding time for TPH gasoline was exceeded by six days in the samples listed. In addition, the holding time of 14 days for cyanide was exceeded by 1 day in sample 9107X061. No other holding times were exceeded.

2. Due to accuracy problems, the results for the following analyte are considered estimates (J) and usable for limited purposes only.

- Thallium in samples 9107X058 through 9107X061

The matrix spike recovery for thallium was 68.2% (75-125% QC limit). The sample results are biased low for thallium.

The matrix spike and blank spike recoveries for selenium were above the QC acceptance limits, but the samples were not qualified because the sample results were non-detected.

3. Due to precision problems, the results for the following analytes are considered estimates (J) and usable for limited purposes only.

- Antimony and zinc in samples 9107X058 through 9107X061

The relative percent differences of antimony and zinc were 126% and 113% (20% QC limit) in the matrix duplicate sample.

4. Percent recoveries (%R) slightly above the QC limits were reported as follows for the pesticide/PCB matrix spike/matrix spike duplicate (MS/MSD) samples.

<u>Analyte</u>	<u>MS %R</u>	<u>MSD %R</u>
gamma-BHC	125	128
dieldrin	143	146
endrin	145	145

The relative percent differences were all within the acceptable range. The pesticide sample results are not affected.

The percent recovery for 4-nitrophenol was 89% (10-80% QC limit) in the semi-volatile MSD sample. No results are affected.

5. All quality control criteria reviewed, other than those discussed above, were met and are considered acceptable. All other results are considered valid and usable for all purposes.

## 2.0 REVIEW OF HOLDING TIMES

NET Log # 6116

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ANALYSIS AND EXTRACTION DATE/ HOLDING TIME(S)

Laboratory NET

Sample Delivery Group 4107X058

QA Reviewer/Firm MES / PRC

Review Date 5/22/91

Sample Matrix Water

CLP SOC

**(soil: extract 14 days**

**analyze 40 days**

**water: extract 7 days**

analyze 40 days)

### CLP Pesticides/PCBs

**(soil: extract 14 days**

**analyze 40 days**

**water: extract 7 days**

analyze 40 days)

CLP VOC

**(14 days for soil and water)**

## Extract

## Analyze

## Extract

## Analyze

[illegible]

\* = Holding Time exceeded

**Note: all holding times in days**



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ANALYSIS DATE/HOLDING TIME

**[1] -Including Molybdenum**  
**\* - Holding Time exceeded**  
**Note: all holding times in days**

## 2.2 REVIEW OF HOLDING TIMES

### non-CLP INORGANICS ANALYSES

Page 3 of 16

Laboratory NET  
Sample Delivery Group 9107 X058  
QA Reviewer/Firm MES/PRC  
Review Date 5/22/91  
Sample Matrix Water

## ANALYSIS DATE/HOLDING TIME

[illegible]

\* - Holding Time exceeded  
Note: all holding times in days.

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ANALYSIS AND/OR EXTRACTION DATE/HOLDING TIME

\* = Holding Time exceeded  
Note: all holding times in days.

Laboratory NET  
Sample Delivery Group 9107X05B  
QA Reviewer/Firm MES/PRC  
Review Date 5/22/91  
Sample Matrix Water

## ADJUSTED AND QUALIFIED SAMPLES

Lab. Blank Sample Number & detected analytes	Concentration (ug/l) mg/kg	5 or 10x Value	(Old value/New Value)	(Old value/New Value)	(Old value/New Value)	(Old value/New Value)	(Old value/New Value)
-------------------------------------------------	----------------------------------	-------------------	-----------------------	-----------------------	-----------------------	-----------------------	-----------------------

[illegible]

NA also D.D.L.D

### 3.1 LABORATORY BLANK REVIEW

Page 6 of 16Laboratory NET

Sample Delivery Group 9107 x 058

QA Reviewer/Firm NES / PRC

Review Date 5/22/91

Sample Matrix Water

## ADJUSTED AND QUALIFIED SAMPLES

[illegible]

### 3.2 LABORATORY BLANK REVIEW CLP PESTICIDES/PCBs

Page 7 of 16Laboratory NET

Sample Delivery Group 9107 x05g

QA Reviewer/Firm ME S / PRC

Review Date 5/22/91

Sample Matrix Water

## ADJUSTED AND QUALIFIED SAMPLES

Lab. Blank	Sample Number	Concentration	5 or 10x	Sample Number	Sample Number	Sample Number	Sample Number	Sample Number
& detected analytes		(ug/l)	Value	(Old value/New Value)	(Old value/New Value)	(Old value/New Value)	(Old value/New Value)	(Old value/New Value)

[illegible]

### 3.3 LABORATORY BLANK REVIEW CLP INORGANICS

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Laboratory NET  
Sample Delivery Group 9107X058  
QA Reviewer/Firm MES/PRC  
Review Date 5/22/91  
Sample Matrix Water

### QUALIFIED SAMPLES

[illegible]

**[1] = laboratory blank, e.g. ICB,CCB,PB,etc.**

Laboratory NET  
Sample Delivery Group 9/07X058  
QA Reviewer/Firm ME3/PRC  
Review Date 5/22/91  
Sample Matrix Water

## QUALIFIED SAMPLES

**[1] = laboratory blank, e.g. PB etc.**



# 4.6 VIEW OF SURROGATE RECOVERIES CLP ORGANICS

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Laboratory NET  
Sample Delivery Group 9107X058  
QA Reviewer/Firm MES/PRC  
Review Date 5/22/91  
Sample Matrix WATER

**VOLATILES**

	QC LIMIT Water	Soil
toluene-d8	88-110	81-117
bromofluorobenzene	86-115	74-121
1,2-dichloroethane-d4	76-114	70-121

<u>9107X058</u> Sample Number	<u>9107X059</u> Sample Number	<u>9107X060</u> Sample Number	<u>9107X061</u> Sample Number	<u>9107X062</u> Sample Number
Surrogate Value	Surrogate Value	Surrogate Value	Surrogate Value	Surrogate Value
97	98	99	104	110
102	105	104	93	97
106	108	113	91	87
Qualifier	Qualifier	Qualifier	Qualifier	Qualifier

**SEMIVOLATILES**

nitrobenzene-d5	35-114	35-114 23-120
2-fluorobiphenyl	43-116	43-116 33-115
terphenyl-d14	33-141	33-141 13-137
phenol-d5	10.0-94	10.0-94 24-113
2-fluorophenol	21-100	21-100 25-121
2,4,6-tribromophenol	10-123	10-123 19-122

71	73	77	82	
81	75	76	86	
76	75	76	79	
58	41	17	74	
60	37	22	77	
80	75	50	65	
Qualifier	Qualifier	Qualifier	Qualifier	Qualifier

**PESTICIDES/PCBs**

dibutylchlorodate	24-154	20-150
-------------------	--------	--------

86	91	84	120	
Qualifier	Qualifier	Qualifier	Qualifier	Qualifier

\* = Values outside of QC limits

# 4.1 REVIEW OF SURROGATE RECOVERIES non-CLP ORGANICS

Page 11 of 16

Laboratory NET  
Sample Delivery Group 9107X058  
QA Reviewer/Firm MES/PRC  
Review Date 5/22/91  
Sample Matrix Water

QC LIMIT  
Water Soil

## METHOD 8010

bromochloromethane  
2-bromo-1-chloropropane  
1,4-dichlorobutane


## METHOD 8020

alpha, alpha, alpha,  
trifluorotoluene

--	--

## TPH Gasoline

Bromofluorobenzene 50-150 50-150

9107X058 9107X059 9107X060 9107X061 \_\_\_\_\_  
Sample Number Sample Number Sample Number Sample Number Sample Number

Surrogate Value Surrogate Value Surrogate Value Surrogate Value Surrogate Value


Qualifier\_\_\_\_ Qualifier\_\_\_\_ Qualifier\_\_\_\_ Qualifier\_\_\_\_ Qualifier\_\_\_\_

--	--	--	--	--

Qualifier\_\_\_\_ Qualifier\_\_\_\_ Qualifier\_\_\_\_ Qualifier\_\_\_\_ Qualifier\_\_\_\_

<u>98</u>	<u>88</u>	<u>94</u>	<u>74</u>	
-----------	-----------	-----------	-----------	--

Qualifier\_\_\_\_ Qualifier\_\_\_\_ Qualifier\_\_\_\_ Qualifier\_\_\_\_ Qualifier\_\_\_\_

\* = Values outside of QC limits

# 5.0 REVIEW OF MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERIES AND RPDs CLP ORGANICS

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Laboratory NET  
Sample Delivery Group 9107X058  
QA Reviewer/Firm MES/PRC  
Review Date 5/22/91  
Sample Matrix Water

## ADJUSTED AND QUALIFIED SAMPLES

	QC LIMITS (%R / %RPD)		<u>9107X057</u>								
	Water	Soil	Sample Number			Sample Number			Sample Number		
VOLATILES (VOC)			81857 MS %R	81858 MSD %R	81859 RPD	MS %R	MSD %R	RPD	MS %R	MSD %R	RPD
1,1-dichloroethane	61-145/14	59-172/22	90	95	4.8						
trichloroethane	71-120/14	62-137/23	88	93	5.7						
benzene	76-127/11	66-142/21	73	72	1.4						
toluene	76-125/13	59-139/21	88	91	4.2						
chlorobenzene	75-130/13	60-133/21	83	83	φ						
SEMIVOLATILES (SOC)			81883	81884	81885						
phenol	12-89/42	26-90/35	69	78	12						
2-chlorophenol	27-123/40	25-102/50	59	70	17						
1,4-dichlorobenzene	36-97/28	28-104/27	66	71	7.3						
N-nitroso-di-n-propylamine	41-116/38	41-126/38	57	63	10						
1,2,4-trichlorobenzene	39-98/28	38-107/23	71	76	6.8						
4-chloro-3-methylphenol	23-97/42	26-103/33	74	79	6.5						
acenaphthene	46-118/31	31-137/19	76	79	3.9						
4-nitrophenol	10-80/50	11-114/50	75	89 *	17						
2,4-dinitrotoluene	24-96/38	28-89/47	63	68	7.6						
pentachlorophenol	9-103/50	17-109/47	80	83	3.7						
pyrene	26-127/31	35-142/36	75	69	8.3						
PESTICIDES/PCBs			81866	81867	81872						
gamma-BHC (lindane)	56-123/15	46-127/50	125 *	128 *	2.4						
heptachlor	40-131/20	35-130/31	74	81	9						
aldrin	40-120/22	34-132/43	85	97	13						
dieldrin	52-126/18	31-134/38	143 *	146 *	2.1						
endrin	56-121/21	42-139/45	145 *	145 *	φ						
4,4'-DDT	38-127/27	23-134/50	73	70	4.2						

\* = Values outside of QC limits

# 5.1 REVIEW OF MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERIES AND RPDs NON-CLP ANALYTES

Page 13 of 16

Laboratory NET  
Sample Delivery Group 9107X058  
QA Reviewer/Firm MES/PRC  
Review Date 5/22/91  
Sample Matrix Water

## ADJUSTED AND QUALIFIED SAMPLES

	QC LIMITS (%R / %RPD)		<u>9107X057</u> Sample Number			Sample Number			Sample Number		
	Water	Soil	MS %R	MSD %R	RPD	MS %R	MSD %R	RPD	MS %R	MSD %R	RPD
<b>METHOD 8010</b>											
1,1-dichloroethene	61-145/14	59-172/22									
chloroform											
bromodochloromethane											
trichloroethene	71-120/14	62-137/24									
tetrachloroethene											
chlorobenzene	75-130/13	60-133/21									
<b>METHOD 8020</b>											
toluene	76-125/13	59-139/21									
benzene	76-127/11	66-142/21									
TPH Diesel	50-150/50	50-150/50	71	69	2.1						
TPH Gasoline	50-150/50	50-150/50	83	101	20						
Oil and Grease	85-115/30	85-115/30	97	92	5.6						
Chloride	50-150/50	50-150/50									
Nitrate	50-150/50	50-150/50									
Sulfate	50-150/50	50-150/50									
o-Phosphate	50-150/50	50-150/50									
Chromium VI	70-130/30	70-130/40									
Total Dissolved Solids	70-130/15	NA									

\* = Values outside of QC limits

## 6.0 REVIEW OF MATRIX DUPLICATES

Page 14 of 16

Laboratory NET  
Sample Delivery Group 9107X058  
QA Reviewer/Firm MES /PRC  
Review Date 5/22/91  
Sample Matrix Water

### QUALIFIED ASSOCIATED SAMPLES

SAMPLE NUMBER	9107X057
DUPLICATE SAMPLE NUMBER	Matrix Dup 81794

9107X058    9107X059    9107X060    9107X061    \_\_\_\_\_  
Sample Number   Sample Number   Sample Number   Sample Number   Sample Number

[illegible]

• RPD exceeds QAPP limit.

# = RPD exceed Functional Guideline limit (CLP inorganics only)

## 7.0 REVIEW OF BLANK SPIKES

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Laboratory NET

Sample Delivery Group 9107X058

QA Reviewer/Firm MES/PRC

Review Date 5/22/91

Sample Matrix Water

Lab Sample Number Blank Spice 81792

### QUALIFIED ASSOCIATED SAMPLES

9107X058   9107X059   9107X060   9107X061   \_\_\_\_\_  
Sample Number   Sample Number   Sample Number   Sample Number   Sample Number

[illegible]

**T**-total concentration found in spiked sample.

**A=actual spike concentration added to sample.**

\* = exceeds QAPP limit

# = exceeds Functional Guideline Limit

Laboratory NET  
Sample Delivery Group 9107x058  
QA Reviewer/Firm MEG/PCS  
Review Date 5/22/91  
Sample Matrix Water

### QUALIFIED ASSOCIATED SAMPLES

Laboratory NET  
Sample Delivery Group 9107x058  
QA Reviewer/Firm MES/PES  
Review Date 5/22/91  
Sample Matrix Water

9107X058      9107X059      9107X060      9107X061      \_\_\_\_\_  
Sample Number      Sample Number      Sample Number      Sample Number      Sample Number

SAMPLE NUMBER & analytes outside of QC limits	% R	IDL	Value/Qualifier	Value/Qualifier	Value/Qualifier	Value/Qualifier	Value/Qualifier
--------------------------------------------------	-----	-----	-----------------	-----------------	-----------------	-----------------	-----------------

[illegible]

## QA/QC DATA REVIEW SUMMARY

### 1.0 QA\QC Narrative

Site: Hunters Point Annex (CTO 0106)  
 Laboratory: NET Pacific, Inc.  
 QA Reviewer: Thorsten Anderson, PRC  
 Review Date: May 23, 1991

Batch No.: 9105G597 (NET Log No. 5919)  
 Sample No.: 9105G597 through 9105G600  
 Analyses: Volatiles, semi-volatiles, pesticides/PCBs, metals (including molybdenum), cyanide, TPH diesel, TPH gasoline, oil and grease, and pH

Collection Date: February 1, 1991  
 QC Criteria Reviewed: Holding time, laboratory blanks, surrogate recoveries, matrix spike/matrix spike duplicate, matrix duplicate and blind spike

The data were reviewed according to EPA documents "Laboratory Data Validation Functional Guidelines for Evaluating Organic Analyses" (February 1988) and "Laboratory Data Validation Functional Guidelines for Evaluating Inorganic Analyses" (July 1988).

### Comments

1. Due to holding time problems, the results for the following analytes are considered estimated (J) and usable for limited purposes only.

- All volatile analytes in sample 9105G597
- Mercury in samples 9105G597, 9105G599, and 9105G600
- pH in all samples

The volatiles in sample 9105G597 were analyzed 34 days after the collection date. Mercury in the samples listed was analyzed 43 days after collection. In addition, pH in samples 9105G597 through 9105G600 was analyzed 4 days after the collection date. The results for these samples are considered estimates as stated above.

Technical holding times were met for the other analyses.

2. Due to blank contamination problems, the results for the following analytes are considered non-detected and estimated (UJ) and usable for limited purposes only.

- Methylene chloride in samples 9105G597 through 9105G600
- Acetone in samples 9105G597 through 9105G599
- Heptachlor in samples 9105G597, 9105G599, and 9105G600

Methylene chloride and heptachlor were found in the laboratory blanks at concentrations of 4.2  $\mu\text{g/kg}$  and 3.6  $\mu\text{g/kg}$ , respectively. Acetone was not found in the volatile laboratory blanks, but is considered a common laboratory contaminant. The quantitation limits for these samples may have been raised according to the blank qualification rules.

3. Due to surrogate recovery problems, the result for the following analyte is considered estimated (J) and usable for limited purposes only.

- TPH gasoline in sample 9105G600



The recovery of the TPH gasoline surrogate, bromofluorobenzene, was 19% in sample 9105G600. This recovery is below the 50-150% QC acceptance limits. The surrogate recovery of 2,4,6-tribromophenol was 149% (QC limit of 19-122%) in sample 9105G597. This problem does not affect the quality of the data because only one semi-volatile surrogate was out.

4. Due to accuracy problems, the results for the following analytes are considered estimates (J) and usable for limited purposes only.

- Antimony and calcium in all samples analyzed

The matrix spike recovery for antimony was 65.4% (75-125% QC limit). The blank spike recovery for calcium was 159% (70-130% QC limit). The sample results for antimony are biased low, while the results for calcium are biased high.

5. Due to precision problems, the results for the following analyte are considered estimates (J) and usable for limited purposes only.

- Copper in all samples analyzed

The relative percent difference of copper was 71% (20% QC limit) in the matrix duplicate sample.

6. High percent recoveries of 134-149% were reported for gamma-BHC and heptachlor in the pesticide/PCB matrix spike/matrix spike duplicate (MS/MSD) samples. This pesticide/PCB spiking problem is not expected to affect the sample results.
7. All quality control criteria reviewed, other than those discussed above, were met and are considered acceptable. All other results are considered valid and usable for all purposes.

**2.0 REVIEW OF HOLDING TIMES  
ORGANIC CLP ANALYSES**

NET Log #5919

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ANALYSIS AND EXTRACTION DATE/ HOLDING TIME(S)

Laboratory NET  
Sample Delivery Group 910SG597  
QA Reviewer/Firm TA/PRC  
Review Date 5-23-91  
Sample Matrix Soil

CLP SOC  
(soil: extract 14 days  
analyze 40 days  
water: extract 7 days  
analyze 40 days)

CLP Pesticides/PCBs  
(soil: extract 14 days  
analyze 40 days  
water: extract 7 days  
analyze 40 days)

CLP VOC

(14 days for soil and water)

Sample Number	Sample Date	CLP VOC (14 days for soil and water)	Extract	Analyze	Extract	Analyze
910SG597	2-01-91	3-07-91 <sup>a</sup> (20)	2-11-91	3-11-91	2-11-91	3-13-91
910SG598	2-01-91	2-11-91	2-11-91	3-11-91	2-11-91	3-13-91
910SG599	2-01-91	2-11-91	2-11-91	3-11-91	2-11-91	3-13-91
910SG600	2-01-91	2-11-91	2-11-91	3-20-91	2-11-91	3-13-91

\* = Holding Time exceeded

Note: all holding times in days

a = Originally analyzed on 2-11-91

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Sample Matrix Soil

ANALYSIS DATE/HOLDING TIME

[illegible]

**Note: all holding times in days**

## Page 3 of 16

ANALYSIS DATE/HOLDING TIME

Sample Matrix Soil

**Chromium VI**  
soil: 7 days for extract;  
24 hours analysis  
water: 24 hour analysis

[illegible]

**Note: all holding times in days.**

2. REVIEW OF HOLDING TIMES  
non-CLP ORGANICS ANALYSES

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Laboratory NET

Sample Delivery Group 9105G597

QA Reviewer/Firm TA/RCL

Review Date 5-23-91

Sample Matrix Soil

ANALYSIS AND/OR EXTRACTION DATE/HOLDING TIME

Sample Number	Sample Date	8010 (14 days)	BETX, 8020 (7 days)	TPH, Gasoline (7 days water, 14 days soil)	TPH, Diesel (14 days extract, 40 days analyze)		Oil and Grease (28 days)
					Extract	Analyze	
9105G597	2-01-91			2-09-91	2-10-91	2-12-91	2-15-91
9105G598	2-01-91			2-10-91	2-10-91	2-12-91	2-15-91
9105G599	2-01-91			2-10-91	2-10-91	2-12-91	2-15-91
9105G600	2-01-91			2-10-91	2-10-91	2-12-91	2-15-91

\* = Holding Time exceeded  
Note: all holding times in days.

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## ADJUSTED AND QUALIFIED SAMPLES

Sample Matrix Soil

91056600

**Sample Number**

(Old value/New Value)

[illegible]

N.D. = None Detected

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## ADJUSTED AND QUALIFIED SAMPLES

[illegible]

Laboratory NET  
Sample Delivery Group 910SGS97  
QA Reviewer/Firm TA/PRL  
Review Date 5-23-91  
Sample Matrix soil

Laboratory NET  
Sample Delivery Group 910SGS97  
QA Reviewer/Firm TA/PRL  
Review Date 5-23-91  
Sample Matrix soil

Laboratory NET  
Sample Delivery Group 910SGS97  
QA Reviewer/Firm TA/PRL  
Review Date 5-23-91  
Sample Matrix soil

Laboratory NET  
Sample Delivery Group 910SGS97  
QA Reviewer/Firm TA/PRL  
Review Date 5-23-91  
Sample Matrix soil

Laboratory NET  
Sample Delivery Group 910SGS97  
QA Reviewer/Firm TA/PRL  
Review Date 5-23-91  
Sample Matrix soil



### 3.3 LABORATORY BLANK REVIEW

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Laboratory NET  
Sample Delivery Group 910SGS97  
QA Reviewer/Firm TA/PRC  
Review Date 5-23-91  
Sample Matrix Soil

## QUALIFIED SAMPLES

[illegible]

[1] = laboratory blank, e.g. ICB,CCB,PB,etc.

## Page 9 of 16

## QUALIFIED SAMPLES

[illegible]

ND = None Detected

# 4.0 REVIEW OF SURROGATE RECOVERIES CLP ORGANICS

Page 10 of 16

Laboratory NET  
Sample Delivery Group 910SG597  
QA Reviewer/Firm TH/PRC  
Review Date 5-23-91  
Sample Matrix Soil

	QC LIMIT		<u>910SG597</u>	<u>910SG598</u>	<u>910SG599</u>	<u>910SG600</u>	
	Water	Soil	Sample Number	Sample Number	Sample Number	Sample Number	Sample Number
VOLATILES			Surrogate Value	Surrogate Value	Surrogate Value	Surrogate Value	Surrogate Value
toluene-d8	88-110	81-117	106	101	94	109	
bromofluorobenzene	86-115	74-121	93	89	94	81	
1,2-dichloroethane-d4	76-114	70-121	116	92	89	84	
			Qualifier	Qualifier	Qualifier	Qualifier	Qualifier

SEMIVOLATILES							
nitrobenzene-d5	35-114	35-114 <sup>23-120</sup>	85	74	81	59	
2-fluorobiphenyl	43-116	43-116 <sup>20-115</sup>	100	101	101	72	
terphenyl-d14	33-141	33-141 <sup>18-137</sup>	111	119	127	73	
phenol-d5	10.0-94	10.0-94 <sup>24-113</sup>	63	71	85	62	
2-fluorophenol	21-100	21-100 <sup>25-121</sup>	31	73	75	53	
2,4,6-tribromophenol	10-123	10-123 <sup>19-122</sup>	14 *	70	96	59	
			Qualifier	Qualifier	Qualifier	Qualifier	Qualifier

PESTICIDES/PCBs							
dibutylchlorodate	24-154	20-150	80	116	79	76	
			Qualifier	Qualifier	Qualifier	Qualifier	Qualifier

\* = Values outside of QC limits

# 4.1 REVIEW OF SURROGATE RECOVERIES non-CLP ORGANICS

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Laboratory NET  
Sample Delivery Group 910SG597  
QA Reviewer/Firm TA/PRC  
Review Date 5-23-91  
Sample Matrix soil

	QC LIMIT		<u>910SG597</u>	<u>910SG598</u>	<u>910SG599</u>	<u>910SG600</u>	
	Water	Soil	Sample Number	Sample Number	Sample Number	Sample Number	Sample Number
METHOD 8010			Surrogate Value	Surrogate Value	Surrogate Value	Surrogate Value	Surrogate Value
bromochloromethane							
2-bromo-1-chloropropane							
1,4-dichlorobutane							
			Qualifier	Qualifier	Qualifier	Qualifier	Qualifier
METHOD 8020							
alpha,alpha, alpha,-trifluorotoluene							
			Qualifier	Qualifier	Qualifier	Qualifier	Qualifier
TPH Gasoline							
Bromofluorobenzene	50-150	50-150	<u>75</u>	<u>78</u>	<u>58</u>	<u>19 *</u>	
			Qualifier	Qualifier	Qualifier	Qualifier	Qualifier

\* = Values outside of QC limits

# 5.0 REVIEW OF MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERIES AND RPDs CLP ORGANICS

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Laboratory NET  
Sample Delivery Group 910SG597  
QA Reviewer/Firm TA/PRC  
Review Date 5-23-91  
Sample Matrix Soil

## ADJUSTED AND QUALIFIED SAMPLES

	QC LIMITS (%R / %RPD)		9106 H 587 Sample Number			N/A Sample Number (81539 / 81540)			N/A Sample Number (81535 / 81536)		
	Water	Soil	MS %R	MSD %R	RPD	MS %R	MSD %R	RPD	MS %R	MSD %R	RPD
<b>VOLATILES (VOC)</b>											
1,1-dichloroethene	61-145/14	59-172/22				105	103	2.3	83	89	7.0
trichloroethene	71-120/14	62-137/23				98	98	<1	90	94	4.3
benzene	76-127/11	66-142/21				90	89	1.3	103	87	17
toluene	76-125/13	59-139/21				107	103	4.0	87	85	2.3
chlorobenzene	75-130/13	60-133/21				94	97	3.3	80	96	18
<b>SEMIVOLATILES (SOC)</b>											
phenol	12-89/42	26-90/35				50	49	2.0			
2-chlorophenol	27-123/40	25-102/50				39	42	7.4			
1,4-dichlorobenzene	36-97/28	28-104/27				29	36	22			
N-nitroso-di-n-propylamine	41-116/38	41-126/38				50	49	2.0			
1,2,4-trichlorobenzene	39-98/28	38-107/23				38	43	12			
4-chloro-3-methylphenol	23-97/42	26-103/33				62	56	10			
acenaphthene	46-118/31	31-137/19				61	54	12			
4-nitrophenol	10-80/50	11-114/50				75	70	6.9			
2,4-dinitrotoluene	24-96/38	28-89/47				61	58	5.0			
pentachlorophenol	9-103/50	17-109/47				75	68	9.8			
pyrene	26-127/31	35-142/36				61	55	10			
<b>PESTICIDES/PCBs</b>											
gamma-BHC (lindane)	56-123/15	46-127/50	134*	149*	10						
heptachlor	40-131/20	35-130/31	MI*	MI*	12						
aldrin	40-120/22	34-132/43	85	98	15						
dieldrin	52-126/18	31-134/38	92	101	9.0						
endrin	56-121/21	42-139/45	97	102	5.0						
4,4'-DDT	38-127/27	23-134/50	78	77	0.0						

\* = Values outside of QC limits

MI = Matrix Interference

# 5.1 REVIEW OF MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERIES AND RPDs NON-CLP ANALYTES

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Laboratory NET  
Sample Delivery Group 910SG597  
QA Reviewer/Firm TA/PRC  
Review Date 5-23-91  
Sample Matrix soil

## ADJUSTED AND QUALIFIED SAMPLES

	QC LIMITS (%R / %RPD)		<u>N/A</u> Sample Number			<u>N/A</u> Sample Number			<u>9106HS88</u> Sample Number		
	Water	Soil	MS %R	MSD %R	RPD	MS %R	MSD %R	RPD	MS %R	MSD %R	RPD
METHOD 8010											
1,1-dichloroethene	61-145/14	59-172/22									
chloroform											
bromodochloromethane											
trichloroethene	71-120/14	62-137/24									
tetrachloroethene											
chlorobenzene	75-130/13	60-133/21									
METHOD 8020											
toluene	76-125/13	59-139/21									
benzene	76-127/11	66-142/21									
			(81579 / 81580)			(81602 / 81603)					
TPH Diesel	50-150/50	50-150/50							NA	NA	9.1
TPH Gasoline	50-150/50	50-150/50	103	100	4.3	103	100	4.3			
			(81564 / 81565)								
Oil and Grease	85-115/30	85-115/30	100	94	6.2						
Chloride	50-150/50	50-150/50									
Nitrate	50-150/50	50-150/50									
Sulfate	50-150/50	50-150/50									
o-Phosphate	50-150/50	50-150/50									
Chromium VI	70-130/30	70-130/40									
Total Dissolved Solids	70-130/15	NA									

\* = Values outside of QC limits

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Laboratory NET  
Sample Delivery Group 91DSG597  
QA Reviewer/Firm TA/PRC  
Review Date 5-23-11  
Sample Matrix gdi

**SAMPLE NUMBER**  
**DUPLICATE SAMPLE NUMBER**

9105 H 585
- 84433

910SG597   910SG598   910SG599   910SG600   \_\_\_\_\_  
Sample Number   Sample Number   Sample Number   Sample Number   Sample Number

[illegible]

\* = RPD exceeds QAPP limit.

# = RPD exceed Functional Guideline limit (CLP inorganics only)

Laboratory NET

Sample Delivery Group 910SG597

QA Reviewer/Firm TA PRC

Review Date 5-23-91

Sample Matrix Soil

Lab Sample Number                     

### QUALIFIED ASSOCIATED SAMPLES

91056597 91056598 91056599 91056600 \_\_\_\_\_  
Sample Number Sample Number Sample Number Sample Number Sample Number

[illegible]

T=total concentration found in spiked sample.

**A=actual spike concentration added to sample.**

\* = exceeds QAPP limit

# = exceeds Functional Guideline Limit



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### QUALIFIED ASSOCIATED SAMPLES

<u>91056597</u>	<u>91056598</u>	<u>91056599</u>	<u>91056600</u>	<u>          </u>
Sample Number	Sample Number	Sample Number	Sample Number	Sample Number
Value/Qualifier	Value/Qualifier	Value/Qualifier	Value/Qualifier	Value/Qualifier

[illegible]

## QA/QC DATA REVIEW SUMMARY

### 1.0 QA\QC Narrative

**Site:** Hunters Point Annex (CTO 0106)  
**Laboratory:** NET Pacific, Inc.  
**QA Reviewer:** Thorsten Anderson, PRC  
**Review Date:** May 20, 1991

**Batch No.:** 9105H585 (NET Nos. 5918 and 5975)  
**Sample No.:** 9105H585, 9105H586, 9106H591, 9106H592, 9106G603, and 9106G604  
**Analyses:** Volatiles, semi-volatiles, pesticides/PCBs, metals (including molybdenum), cyanide, TPH diesel, TPH gasoline, oil and grease, and pH

**Collection Date:** January 31 through February 6, 1991  
**QC Criteria Reviewed:** Holding time, laboratory blanks, surrogate recoveries, matrix spike/matrix spike duplicate, matrix duplicate and blind spike

The data were reviewed according to EPA documents "Laboratory Data Validation Functional Guidelines for Evaluating Organic Analyses" (February 1988) and "Laboratory Data Validation Functional Guidelines for Evaluating Inorganic Analyses" (July 1988).

### Comments

1. Due to holding time problems, the results for the following analytes are considered estimated (J) and usable for limited purposes only.

- All volatile analytes in samples 9105H586, 9106H592, 9106G603, and 9106G604
- All semi-volatile analytes in sample 9106H591
- Mercury in samples 9105H585, 9105H586, 9106G603, and 9106G604
- pH in samples 9105H585 and 9105H586

<u>Extraction/Analysis</u>	<u>Required Holding Time</u>	<u>Holding Time Exceeded by</u>
Volatiles analysis	14 days	1-14 days
Semi-volatile extraction	14 days	22 days
Mercury analysis	28 days	1-6 days
pH analysis	3 days	2 days

Technical holding times were met for the other analyses.

2. Due to blank contamination problems, the results for the following analytes are considered non-detected and estimated (UJ) and usable for limited purposes only.

- Methylene chloride in samples 9105H585 and 9105H586
- Acetone in sample 9105H585
- Heptachlor in all samples analyzed

Methylene chloride and acetone were not found in the volatile laboratory blanks, but are considered common laboratory contaminants. Heptachlor was found in the laboratory blank associated with this sample group at concentrations of 3.6-77  $\mu\text{g/kg}$ . The quantitation limits for these samples may have been raised according to the blank qualification rules.

3. Due to surrogate recovery problems, the results for the following analytes are considered estimated (J) and usable for limited purposes only.

- All volatile analyses in sample 9106H592
- All positive results for semi-volatile analytes in sample 9106G603
- TPH gasoline in sample 9106H592

All negative results in the semi-volatile analytes in sample 9106G603 are considered rejected (R) and unusable for any purposes due to the low surrogate recovery of 2-fluorophenol (6.4%).

The recovery of the volatile surrogate, 1,2-dichloroethane-d4, was below the QC acceptance limit for sample 9106H592. The recovery was 40% in this sample.

The recoveries of the semi-volatile surrogates, nitrobenzene-d5 and 2-fluorophenol, were below the QC acceptance limit in sample 9106G603. The recoveries were 15% and 6.4%, respectively.

The recovery of the TPH gasoline surrogate, bromofluorobenzene, was 26% in the sample 9106H592. This recovery is below the 50-150% QC acceptance limits.

4. Due to accuracy problems, the results for the following analytes are considered estimates (J) and usable for limited purposes only.

- Antimony and calcium in all samples analyzed

The matrix spike recovery for antimony was 65.4% (75-125% QC limit). The blank spike recovery for calcium was 158.9% (70-130% QC limit). The sample results are biased low for antimony and biased high for calcium.

5. High percent recoveries of 134-149% were reported for gamma-BHC, heptachlor, and dieldrin in the pesticide/PCB matrix spike/matrix spike duplicate samples. High recoveries of 143-770% were also reported for heptachlor in the pesticide/PCB blank spike samples. These pesticide/PCB spiking problems are not expected to affect the sample results.

6. All quality control criteria reviewed, other than those discussed above, were met and are considered acceptable. All other results are considered valid and usable for all purposes.

## 2.0 REVIEW OF HOLDING TIMES

Page 1 of 18

## ANALYSIS AND EXTRACTION DATE/ HOLDING TIME(S)

Laboratory NET

Sample Delivery Group 9105 H585

QA Reviewer/Firm TA PRC

Review Date Mar 20, 1991

Sample Matrix Soil

**CLP SOC**

**(soil: extract 14 days**

**analyze 40 days**

**water: extract 7 days**

**analyze 40 days)**

### CLP Pesticides/PCBs

**(soil: extract 14 days**

**analyze 40 days**

**water: extract 7 days**

analyze 40 days)

[illegible]

\* - Holding Time exceeded

**No.0: all holding times in days**

Q = Originally extracted on 2/19/91

2. REVIEW OF HOLDING TIMES  
INORGANIC CLP ANALYSES

Page 2 of 18

Laboratory NET

Sample Delivery Group 9105H585

QA Reviewer/Firm TA PRC

Review Date May 20, 1991

Sample Matrix Soil

ANALYSIS DATE/HOLDING TIME

Sample Number	Sample Date	CLP Metals[1] (6 months)	CLP Mercury (28 days)	CLP Cyanide (14 days)
9105H585	1-31-91	3-07-91 → 4-17-91	3-06-91 * (6)	2-14-91
9105H586	1-31-91	3-07-91 → 4-17-91	3-06-91 * (6)	2-14-91
9106H591	2-06-91	3-07-91 → 4-17-91	3-06-91	2-14-91
9106H592	2-06-91	3-07-91 → 4-17-91	3-06-91	2-14-91
9106G603	2-05-91	3-07-91 → 4-17-91	3-06-91 * (1)	2-14-91
9106G604	2-05-91	3-07-91 → 4-17-91	3-06-91 * (1)	2-14-91

[1] - Including Molybdenum

\* - Holding Time exceeded

Note: all holding times in days

## 2.2 REVIEW OF HOLDING TIMES non-CLP INORGANICS ANALYSES

Laboratory NET

Sample Delivery Group 9105H585

QA Reviewer/Firm TA/PRC

Review Date May 20, 1991

Sample Matrix 30 Lit

ANALYSIS DATE/HOLDING TIME

[illegible]

\* = Holding Time exceeded

**Note: all holding times in days.**

2. REVIEW OF HOLDING TIMES  
non-CLP ORGANICS ANALYSES

Page 4 of 18

Laboratory NET

Sample Delivery Group 9105H585

QA Reviewer/Firm TH/PRC

Review Date May 20, 1991

Sample Matrix Soil

ANALYSIS AND/OR EXTRACTION DATE/HOLDING TIME

Sample Number	Sample Date	8010 (14 days)	BETX, 8020 (7 days)	TPH, Gasoline (7 days water, 14 days soil)	TPH, Diesel (14 days extract, 40 days analyze)		Oil and Grease (28 days)
					Extract	Analyze	
9105H585	1-31-91			2-08-91	2-09-91	2-10-91	2-15-91
9105H586	1-31-91			2-08-91	2-09-91	2-10-91	2-15-91
9106H591	2-06-91			2-09-91	2-14-91	2-17-91	2-19-91
9106H592	2-06-91			2-10-91	2-14-91	2-17-91	2-19-91
9106G603	2-05-91			2-10-91	2-14-91	2-17-91	2-19-91
9106G604	2-05-91			2-09-91	2-14-91	2-17-91	2-19-91

\* = Holding Time exceeded  
Note: all holding times in days.

### 3.0 LABORATORY BLANK REVIEW

Laboratory NET  
Sample Delivery Group 9105H585  
QA Reviewer/Firm JA PRC  
Review Date May 20, 1991  
Sample Matrix Soil

## ADJUSTED AND QUALIFIED SAMPLES

Lab. Blank Sample Number & detected analytes	Concentration (ug/l)	5 or 10x Value	Sample Number (Old value/New Value)	Sample Number (Old value/New Value)	Sample Number (Old value/New Value)	Sample Number (Old value/New Value)	Sample Number (Old value/New Value)
			7105H585	9105H586			

[illegible]



### 3.1 LABORATORY BLANK REVIEW

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Laboratory NET  
Sample Delivery Group 9105H585  
QA Reviewer/Firm TR PRC  
Review Date May 20, 1991  
Sample Matrix Soil

## ADJUSTED AND QUALIFIED SAMPLES

[illegible]

## Page 7 of 18

## ADJUSTED AND QUALIFIED SAMPLES

Sample Matrix Soil

9106H604  
Sample #

**(Old value/New Value)**

[illegible]

### 3.3 LABORATORY BLANK REVIEW CLINORGNANICS

Page 8 of 18

Laboratory NET  
Sample Delivery Group 9105MS85  
QA Reviewer/Firm TA/PRC  
Review Date May 20, 1991  
Sample Matrix Soil

## QUALIFIED SAMPLES

[illegible]

**[1] - laboratory blank, e.g. ICB,CCB,PB,etc.**

### 3.4 LABORATORY BLANK REVIEW NON-CLP ANALYTES

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Laboratory NET  
Sample Delivery Group 9105H585  
QA Reviewer/Firm TA/PRC  
Review Date May 20, 2011  
Sample Matrix soil

#### QUALIFIED SAMPLES

BLANK SAMPLE NUMBER & detected analytes	Blank Type[1]	Blank Concentration	Sample Number Value/Qualifier	Sample Number Value/Qualifier	Sample Number Value/Qualifier	Sample Number Value/Qualifier	Sample Number Value/Qualifier
-81563							
Oil + Grease	PB	ND					
-81578							
TPH Gasoline	PB	ND					
-81583							
TPH Diesel	PB	ND					
-81601							
TPH Gasoline	PB	ND					
-81637							
Oil + Grease	PB	ND					
-81642							
TPH Gasoline	PB	ND					
-81647							
TPH Diesel	PB	ND					

[1] = laboratory blank, e.g. PB etc.

# 4.0 REVIEW OF SURROGATE RECOVERIES CLP ORGANICS

Page 10 of 18

Laboratory NET  
Sample Delivery Group 9105H585  
QA Reviewer/Firm TA/PRC  
Review Date May 20, 1991  
Sample Matrix Soil

	QC LIMIT		<u>9105H585</u>	<u>9105H586</u>	<u>9106H591</u>	<u>9106H592</u>	<u>9106G603</u>	<u>9106G604</u>
	Water	Soil	Sample Number	Sample Number	Sample Number	Sample Number	Sample Number	Sample #
<b>VOLATILES</b>			Surrogate Value	Surrogate Value	Surrogate Value	Surrogate Value	Surrogate Value	Surrogate
toluene-d8	88-110	81-117	98	97	114	106	109	98
bromofluorobenzene	86-115	74-121	97	95	93	95	80	94
1,2-dichloroethane-d4	76-114	70-121	90	81	116	40 *	116	111
			Qualifier	Qualifier	Qualifier	Qualifier <u>J</u>	Qualifier	Qual
<b>SEMIVOLATILES</b>								
nitrobenzene-d5	35-114	<del>35-114</del> 23-120	42	55	74	68	15 *	69
2-fluorobiphenyl	43-116	<del>43-116</del> 20-115	53	79	87	81	61	82
terphenyl-d14	33-141	<del>33-141</del> 4-137	70	99	87	97	92	93
phenol-d5	10.0-94	<del>10.0-94</del> 24-113	47	53	65	69	25	65
2-fluorophenol	21-100	<del>21-100</del> 25-121	45	36	39	64	6.4 *	55
2,4,6-tribromophenol	10-123	<del>10-123</del> 11-122	51	68	37	79	46	79
			Qualifier	Qualifier	Qualifier	Qualifier	Qualifier <u>J</u> for positive values for acids only for negative values	Qual
<b>PESTICIDES/PCBs</b>								
butylchloredate	24-154	20-150	71	89	101	149	104	131
			Qualifier	Qualifier	Qualifier	Qualifier	Qualifier	Qual

\* = Values outside of QC limits

**4.1 R EW OF SURROGATE RECOVERIES  
non-CLP ORGANICS**

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Laboratory NET  
Sample Delivery Group 910SH585  
QA Reviewer/Firm TA/PRC  
Review Date May 20, 1991  
Sample Matrix soil

	QC LIMIT	
	Water	Soil
METHOD 8010		
bromochloromethane		
2-bromo-1-chloropropane		
1,4-dichlorobutane		

METHOD 8020		
alpha,alpha, alpha,-trifluorotoluene		

TPH Gasoline		
Bromofluorobenzene	50-150	50-150

<u>910SH585</u>	<u>910SH586</u>	<u>9106H591</u>	<u>9106H592</u>	<u>9106G603</u>	<u>9106G604</u>
Sample Number	Sample Number	Sample Number	Sample Number	Sample Number	Sample #
Surrogate Value	Surrogate Value	Surrogate Value	Surrogate Value	Surrogate Value	Surrogate
Qualifier__	Qualifier__	Qualifier__	Qualifier__	Qualifier__	Qual__
Qualifier__	Qualifier__	Qualifier__	Qualifier__	Qualifier__	Qual__
Qualifier__	Qualifier__	Qualifier__	Qualifier__	Qualifier__	Qual__
Qualifier__	Qualifier__	Qualifier__	Qualifier__	Qualifier__	Qual__

\* = Values outside of QC limits

5.0 REVI OF MATRIX SPIKE/MATRIX SPIKE DUPLICATE RE /ERIES AND RPDs  
CLP ORGANICS

Page 12 of 18

Laboratory NET  
Sample Delivery Group 9105H585  
QA Reviewer/Firm TA/PRC  
Review Date May 20, 1991  
Sample Matrix soil

ADJUSTED AND QUALIFIED SAMPLES

	QC LIMITS (%R / %RPD)		N/A			9106H587			N/A		
	Water	Soil	Sample Number (-81535) - 81536)			Sample Number			Sample Number (-81589) - 81590)		
VOLATILES (VOC)			MS %R	MSD %R	RPD	MS %R	MSD %R	RPD	MS %R	MSD %R	RPD
1,1-dichloroethene	61-145/14	59-172/22	83	89	7.0				93	91	1.5
trichloroethene	71-120/14	62-137/23	90	94	4.3				89	102	3.4
benzene	76-127/11	66-142/21	103	87	17				84	87	3.5
toluene	76-125/13	59-139/21	87	85	2.3				89	92	3.8
chlorobenzene	75-130/13	60-133/21	80	96	18				84	82	1.7
SEMI-VOLATILES (SOC)											
phenol	12-89/42	26-90/35									
2-chlorophenol	27-123/40	25-102/50									
1,4-dichlorobenzene	36-97/28	28-104/27									
N-nitroso-di-n-propylamine	41-116/38	41-126/38									
1,2,4-trichlorobenzene	39-98/28	38-107/23									
4-chloro-3-methylphenol	23-97/42	26-103/33									
acenaphthene	46-118/31	31-137/19									
4-nitrophenol	10-80/50	11-114/50									
2,4-dinitrotoluene	24-96/38	28-89/47									
pentachlorophenol	9-103/50	17-109/47									
pyrene	26-127/31	35-142/36									
PESTICIDES/PCBs											
gamma-BHC (lindane)	56-123/15	46-127/50				134 *	149 *	10	90	99	9.5
heptachlor	40-131/20	35-130/31				MI	MI	12	83	140 *	51 *
aldrin	40-120/22	34-132/43				85	98	15	127	94	30
dieldrin	52-126/18	31-134/38				92	101	9.0	148 *	124	18
endrin	56-121/21	42-139/45				97	102	5.0	71	83	16
4,4'-DDT	38-127/27	23-134/50				78	77	0.0	93	80	15

\* = Values outside of QC limits

# 5.0 REVIEW OF MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERIES AND RPDs CLP ORGANICS

Page 13 of 16

Laboratory NET  
Sample Delivery Group 9105H585  
QA Reviewer/Firm TA/PRC  
Review Date May 20, 1991  
Sample Matrix Soil

## ADJUSTED AND QUALIFIED SAMPLES

QC LIMITS (%R / %RPD)			<u>9105H586</u> Sample Number			<u>9106G605</u> Sample Number			<u>9111F107</u> Sample Number		
Water		Soil	MS %R	MSD %R	RPD	MS %R	MSD %R	RPD	MS %R	MSD %R	RPD
<b>VOLATILES (VOC)</b>											
1,1-dichloroethene	61-145/14	59-172/22				89	91	3.1			
trichloroethene	71-120/14	62-137/23				88	88	1.0			
benzene	76-127/11	66-142/21				67	68	1.2			
toluene	76-125/13	59-139/21				90	94	4.3			
chlorobenzene	75-130/13	60-133/21				86	84	2.1			
<b>SEMIVOLATILES (SOC)</b>											
phenol	12-89/42	26-90/35	50	49	2.0				63	63	1
2-chlorophenol	27-123/40	25-102/50	39	42	7.4				64	64	0
1,4-dichlorobenzene	36-97/28	28-104/27	29	36	2.2				61	60	2
N-nitroso-di-n-propylamine	41-116/38	41-126/38	50	49	2.0				74	75	1
1,2,4-trichlorobenzene	39-98/28	38-107/23	38	43	12				65	66	2
4-chloro-3-methylphenol	23-97/42	26-103/33	62	56	10				74	74	0
acenaphthene	46-118/31	31-137/19	61	54	12				76	75	1
4-nitrophenol	10-80/50	11-114/50	75	70	6.9				97	98	1
2,4-dinitrotoluene	24-96/38	28-89/47	61	58	5.0				80	81	1
pentachlorophenol	9-103/50	17-109/47	75	68	9.8				87	87	0
pyrene	26-127/31	35-142/36	61	55	10				78	78	1
<b>PESTICIDES/PCBs</b>											
gamma-BHC (lindane)	56-123/15	46-127/50									
heptachlor	40-131/20	35-130/31									
aldrin	40-120/22	34-132/43									
dieldrin	52-126/18	31-134/38									
endrin	56-121/21	42-139/45									
4,4'-DDT	38-127/27	23-134/50									

\* = Values outside of QC limits



5.1 REV OF MATRIX SPIKE/MATRIX SPIKE DUPLICATE REVERIES AND RPDs  
NON-CLP ANALYTES

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Laboratory NET  
Sample Delivery Group 9105HS85  
QA Reviewer/Firm TA/PRC  
Review Date May 20, 1991  
Sample Matrix soil

	QC LIMITS (%R / %RPD)		<u>N/A</u> Sample Number			ADJUSTED AND QUALIFIED SAMPLES <u>9105G591</u> Sample Number			<u>9105G598</u> Sample Number		
	Water	Soil	MS %R	MSD %R	RPD	MS %R	MSD %R	RPD	MS %R	MSD %R	RPD
METHOD 8010											
1,1-dichloroethene	61-145/14	59-172/22									
chloroform											
bromodochloromethane											
trichloroethene	71-120/14	62-137/24									
tetrachloroethene											
chlorobenzene	75-130/13	60-133/21									
METHOD 8020											
toluene	76-125/13	59-139/21									
benzene	76-127/11	66-142/21									
TPH Diesel	50-150/50	50-150/50				83	102	9.9			
TPH Gasoline	50-150/50	50-150/50	103	100	4.3						
Oil and Grease	85-115/30	85-115/30	100	94	6.2				105	100	4.9
Chloride	50-150/50	50-150/50									
Nitrate	50-150/50	50-150/50									
Sulfate	50-150/50	50-150/50									
o-Phosphate	50-150/50	50-150/50									
Chromium VI	70-130/30	70-130/40									
Total Dissolved Solids	70-130/15	NA									

\* = Values outside of QC limits

# 5.1 REVIEW OF MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERIES AND RPDs NON-CLP ANALYTES

Page 15 of 18

Laboratory \_\_\_\_\_  
Sample Delivery Group \_\_\_\_\_  
QA Reviewer/Firm \_\_\_\_\_  
Review Date \_\_\_\_\_  
Sample Matrix \_\_\_\_\_

## ADJUSTED AND QUALIFIED SAMPLES

	QC LIMITS (%R / %RPD)		<u>9105H585</u> Sample Number			<u>9106H596</u> Sample Number			_____ Sample Number		
	Water	Soil	MS %R	MSD %R	RPD	MS %R	MSD %R	RPD	MS %R	MSD %R	RPD
<b>METHOD 8010</b>											
1,1-dichloroethene	61-145/14	59-172/22									
chloroform											
bromodochloromethane											
trichloroethene	71-120/14	62-137/24									
tetrachloroethene											
chlorobenzene	75-130/13	60-133/21									
<b>METHOD 8020</b>											
toluene	76-125/13	59-139/21									
benzene	76-127/11	66-142/21									
TPH Diesel	50-150/50	50-150/50				84	78	5.8			
TPH Gasoline	50-150/50	50-150/50	110	10%	1.8						
Oil and Grease	85-115/30	85-115/30									
Chloride	50-150/50	50-150/50									
Nitrate	50-150/50	50-150/50									
Sulfate	50-150/50	50-150/50									
o-Phosphate	50-150/50	50-150/50									
Chromium VI	70-130/30	70-130/40									
Total Dissolved Solids	70-130/15	NA									

\* = Values outside of QC limits

## Page 16 of 18

### QUALIFIED ASSOCIATED SAMPLES

Sample Number	Sample Number	Sample Number	Sample Number	Sample Number
---------------	---------------	---------------	---------------	---------------

[illegible]

# = RPD exceed Functional Guideline limit (CLP inorganics only)

## 7.0 R EW OF BLANK SPIKES

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Laboratory NET  
 Sample Delivery Group 9105H585  
 QA Reviewer/Firm TA/PRC  
 Review Date May 20, 1991  
 Sample Matrix Soil  
 Lab Sample Number -

## QUALIFIED ASSOCIATED SAMPLES

9105H585 9105H586 9106H591 9106H592 9106G603 9106G604  
 Sample Number Sample Number Sample Number Sample Number Sample Number Sample #

METHODS AND ANALYTES	T	A	%R	Criteria	Qualifier	Qualifier	Qualifier	Qualifier	Qualifier
Oil + Grease (-81567)			98	-					
Cyanide (-81572)			95	70-130					
Pesticides/PCB (-81577)				30-140					
Aldrin			95						
Gamma-BHC			117						
4,4'-DDT			85						
Dieldrin			109						
Endrin			106						
Heptachlor			143*						
TPH Gasoline (-81581)			104	50-150					
TPH Diesel (-81587)			75	50-150					
Oil + Grease (-81641)			109	-					
TPH Gasoline (-81645)			114	50-150					
TPH Diesel (-81651)			77	50-150					
Pesticides/PCB (-81664)				30-140					
Aldrin			122						
Gamma-BHC			131						
4,4'-DDT			124						
Dieldrin			130						
Endrin			138						
Heptachlor			770*						
Metals (-84431)				70-130					
Calcium			158.9*		J	J	J	J	J

T=total concentration found in spiked sample.

A=actual spike concentration added to sample.

\* = exceeds QAPP limit

# = exceeds Functional Guideline Limit

### 3.0 REVIEW OF MATRIX SPIKES

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Laboratory NET  
Sample Delivery Group 91054585  
QA Reviewer/Firm TA/~~PRC~~  
Review Date TA/~~PRC~~  
Sample Matrix Soil

### QUALIFIED ASSOCIATED SAMPLES

[illegible]

**QA/QC DATA REVIEW SUMMARY****1.0 QA/QC Narrative**

Site: Hunters Point Annex (CTO 0106)  
Laboratory: NET Pacific, Inc.  
QA Reviewer: Christina G. Kabitzke, PRC  
Review Date: May 21, 1991

Batch No.: 9105G593 and 9106H593 (NET Log Nos. 5887 and 6009)  
Sample No.: 9105G593 through 9105G596, and 9106H593 through 9106H596  
Analyses: Volatiles, semi-volatiles, pesticides/PCBs, metals (including molybdenum), cyanide, TPH diesel, TPH gasoline, oil and grease, and pH

Collection Date: January 30 and February 6, 1991  
QC Criteria Reviewed: Holding time, laboratory blanks, surrogate recoveries, matrix spike/matrix spike duplicate, matrix duplicate and blind spike

The data were reviewed according to EPA documents "Laboratory Data Validation Functional Guidelines for Evaluating Organic Analyses" (February 1988) and "Laboratory Data Validation Functional Guidelines for Evaluating Inorganic Analyses" (July 1988).

**Comments**

1. Due to blank contamination problems, the results for the following analytes are considered non-detected and estimated (UJ) and usable for limited purposes only.

- Methylene chloride in samples 9105G593, 9105G595, 9106H593, and 9106H595
- Acetone in samples 9105G593 and 9106H594
- Toluene in samples 9105G593, 9105G594, 9105G596, 9106H593, and 9106H595
- 2-Butanone in samples 9105G595
- Heptachlor in samples 9105G594, 9105G595, and 9106H593 through 9106H596

Methylene chloride and acetone were found in the volatile laboratory blanks at concentrations of 3.9-4.2  $\mu\text{g/kg}$  and 6.3  $\mu\text{g/kg}$ , respectively. Toluene and 2-butanone were not found in the volatile laboratory blanks, but are considered common laboratory contaminants. Heptachlor was not found in the laboratory blanks associated with this sample group but has been found in other laboratory blanks at concentrations up to 210  $\mu\text{g/kg}$ . The quantitation limits for these samples may have been raised according to the blank qualification rules.

2. Due to surrogate recovery problems, the results for the following analytes are considered estimated (J) and usable for limited purposes only.

- All positive results of semi-volatile analytes in sample 9106H595
- All pesticide/PCB analytes in sample 9106H593
- TPH gasoline in samples 9106H594 and 9106H596

Due to the low recovery of 2-fluorophenol in sample 9106H595 (9.5%), all negative results in this sample are considered rejected (R) and unusable for any purposes.

The recoveries of two semi-volatile surrogates, nitrobenzene-d5, 2-fluorophenol, were below the QC acceptance limit in sample 9106H595. The recoveries were 19% and 9.5% respectively.

The recovery of the pesticide/PCB surrogate was below the QC acceptance limit for sample 9106H593. The recovery was 18% in this sample.

The recovery of the TPH gasoline surrogate, bromofluorobenzene, was 21% and 35% in samples 9106H594 and 9106H596, respectively. These recoveries are below the 50-150% QC acceptance limits.

3. Due to holding time problems, the results for the following analytes are considered estimated (J) and usable for limited purposes only.

- All volatile analytes in sample 9105G596, 9106H593, 9106H594, and 9106H596
- All semi-volatile analytes in sample 9105G595
- Mercury in all samples analyzed
- Cyanide in all samples except 9105G593

The holding times for the listed extractions/analyses were exceeded by the following amounts:

<u>Extraction/Analysis</u>	<u>Required Holding Time</u>	<u>Holding Time Exceeded by</u>
Volatiles analysis	14 days	1-22 days
Semi-volatile extraction	14 days	29 days
Mercury	28 days	9-34 days
Cyanide	14 days	1 day

Technical holding times were met for the other analyses.

4. Due to accuracy problems, the results for the following analytes are considered estimates (J) and usable for limited purposes only.

- Antimony in all samples analyzed
- Chromium, manganese, and selenium in samples 9105G593 through 9105G596
- Calcium in samples 9106H593 through 9106H596

The matrix spike recoveries for antimony, chromium, manganese, and selenium were 20.8-65.4%, 55.9%, 67.6%, and 59.8%, respectively (75-125% QC limit). The blank spike recovery for calcium was 159% (70-130% QC limit).

5. Due to precision problems, the results for the following analytes are considered estimates (J) and usable for limited purposes only.

- Mercury in samples 9105G593 through 9105G596
- Copper in samples 9106H593 through 9106H596

The relative percent differences of mercury and copper were 146% and 71% (20% QC limit) in the matrix duplicate samples.

6. The following problems were observed with the matrix spike/matrix spike duplicate (MS/MSD) samples.

- Low recovery of 63% for benzene in the volatile MS sample
- Poor relative percent difference (RPD) of 76% for 4-nitrophenol in the semi-volatile MS/MSD samples
- High percent recoveries of 142-231% for gamma-BHC, heptachlor, and dieldrin in the pesticide/PCB MS sample
- Poor RPD of 57% for heptachlor in the pesticide/PCB MS/MSD samples

These MS/MSD problems are not expected to affect the sample results because they marginally exceed the acceptance limits, or the samples were already qualified for surrogate problems.

**7. All quality control criteria reviewed, other than those discussed above, were met and are considered acceptable. All other results are considered valid and usable for all purposes.**



NET Log<sup>#s</sup> 5887 and 6009

ANALYSIS AND EXTRACTION DATE/ HOLDING TIME(S)

Sample Delivery Group 91050593; 9106H593  
QA Reviewer/Firm Christina G. Kabitzke / PRC  
Review Date 21 May 1991  
Sample Matrix Soil

**CLP Pesticides/PCBs**  
(soil: extract 14 days  
analyze 40 days  
water: extract 7 days  
analyze 40 days)

[illegible]

a = originally extracted on 02/09/91  
b = " analyzed on 02/11/91  
c = " " on 02/20/91

## 2.1 REVIEW OF HOLDING TIMES INORGANIC CLP ANALYSES

Laboratory NET

Sample Delivery Group 91056593 : 91064593

QA Reviewer/Firm CGK/PRC

Review Date 21. May 1991

Sample Matrix Soil

ANALYSIS DATE/HOLDING TIME

[illegible]

**[1] -Including Molybdenum**

\* = Holding Time exceeded

**Note: all holding times in days**

## 2.2 REVIEW OF HOLDING TIMES

Laboratory NET

Sample Delivery Group 91056593 : 9106H593

QA Reviewer/Firm CAL/PRC

Review Date 21. May 1991

Sample Matrix Soil

ANALYSIS DATE/HOLDING TIME

**Chromium VI**  
**soil: 7 days for extract;**  
**24 hours analysis**  
**water: 24 hour analysis**

[illegible]

\* - Holding Time exceeded

**Note: all holding times in days.**

**2.3 VIEW OF HOLDING TIMES**  
**non-CLP ORGANICS ANALYSES**

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Laboratory NET

Sample Delivery Group 91056593 : 91064593

QA Reviewer/Firm CAL/PRC

Review Date 21. May 1991

Sample Matrix SOIL

**ANALYSIS AND/OR EXTRACTION DATE/HOLDING TIME**

Sample Number	Sample Date	8010 (14 days)	BETX, 8020 (7 days)	TPH, Gasoline (7 days water, 14 days soil)	TPH, Diesel (14 days extract, 40 days analyze		Oil and Grease (28 days)
					Extract	Analyze	
91056593	01-30-91			02-03-91	02-08-91	02-10-91	02-11-91
91056594	01-30-91			02-03-91	02-08-91	02-10-91	02-11-91
91056595	01-30-91			02-05-91	02-08-91	02-10-91	02-11-91
91056596	01-30-91			02-03-91	02-08-91	02-10-91	02-11-91
91064593	02-06-91			02-09-91	02-14-91	02-17-91	02-19-91
91064594	02-06-91			02-10-91	02-14-91	02-17-91	02-19-91
91064595	02-06-91			02-09-91	02-14-91	02-17-91	02-19-91
91064596	02-06-91			02-10-91	02-14-91	02-17-91	02-19-91

\* = Holding Time exceeded  
 Note: all holding times in days.

3.0 LABOR DRY BLANK REVIEW  
CLP VOC

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Laboratory NET

Sample Delivery Group 91056593 & 91064593

QA Reviewer/Firm CAL / PRC

Review Date 21. May 1991

Sample Matrix Soil

ADJUSTED AND QUALIFIED SAMPLES

Lab. Blank Sample Number & detected analytes	Concentration (ug/L) mg/kg	5 or 10x Value	91056593 Sample Number (Old value/New Value)	91056594 Sample Number (Old value/New Value)	91056595 Sample Number (Old value/New Value)	91056596 Sample Number (Old value/New Value)	91064593 Sample Number (Old value/New Value)
-------------------------------------------------	----------------------------------	-------------------	----------------------------------------------------	----------------------------------------------------	----------------------------------------------------	----------------------------------------------------	----------------------------------------------------

- 81534							
Acetone	6.3 J	63	108/111UJ	11U	120B/120	1400U	
Methylene chloride	3.9 J	39					
- 81538							
Methylene chloride	4.2 J	42	5.9B/5.9UJ	5.6U	8.4B/8.4UJ	700U	
Toluene	N.D.	25	2.8J/5.5UJ	15/15UJ	160	2900D/2900UJ	
2-Butanone	N.D.	50	11U	11U	23/23UJ	1400U	
//////	//////	////	//////	//////	//////	//////	//////
- 81652	None Detected						
- 81676	None Detected						
Methylene chloride	N.D.	25					4.4J/5.5UJ
Toluene	N.D.	25					3.3J/5.5UJ
Acetone	N.D.	50					11U

N.D. = not detected

### 3.0 LABORATORY BLANK REVIEW

Laboratory NET

Laboratory NCI  
Sample Delivery Group, 91056593; 91064593

QA Reviewer/Firm Cole / PRC

Review Date 21 May 1997

Sample Matrix 501

## ADJUSTED AND QUALIFIED SAMPLES

9106H594

**Sample Number**

91064595

**Sample Number**

9106 H596

**Sample Number**

**Sample Number**

**Sample Number**

**Lab. Blank Sample Number      Concentration      5 or 10x**

### & detected analytes

(uap)

**Value**

**(Old value/New Value)**

(Old value/New Value)

**(Old value/New Value)**

**(Old value/New Value)**

**(Old value/New Value)**

[illegible]

N.D. = not detected

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Laboratory NCI  
Sample Delivery Group 91056593 : 9106H593

## ADJUSTED AND QUALIFIED SAMPLES

Review Date 21 May 1991

Sample Matrix 50510

[illegible]

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### ADJUSTED AND QUALIFIED SAMPLES

Sample Matrix soil

9106H596

**(Old value/New Value)**

[illegible]

N.D. = not detected



### 3.3 LABORATORY BLANK REVIEW CLP INORGANICS

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Laboratory NET

Sample Delivery Group 91056593; 91064593

QA Reviewer/Firm CAL/PRC

Review Date 21 May 1991

Sample Matrix Soil

## QUALIFIED SAMPLES

[illegible]

[1] = laboratory blank, e.g. ICB,CCB,PB,etc.

**3.4 LABC TORY BLANK REVIEW**  
**NON-CLP ANALYTES**

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Laboratory NET

Sample Delivery Group 91056593 ; 9106H593

QA Reviewer/Firm Cole / PRC

Review Date 21 May 1997

Sample Matrix Soil

**QUALIFIED SAMPLES**

BLANK SAMPLE NUMBER & detected analytes	Blank Type[1]	Blank Concentration	Sample Number Value/Qualifier	Sample Number Value/Qualifier	Sample Number Value/Qualifier	Sample Number Value/Qualifier	Sample Number Value/Qualifier
- 81354	PB						
Gasoline		None Detected					
- 81524	PB						
Gasoline		None Detected					
- 81529	PB						
Diesel		None Detected					
- 81551	PB						
Oil & Grease		None Detected					
//////	//////	//////	//////				
- 81601	PB						
Gasoline		None Detected					
- 81642	PB						
Gasoline		None Detected					
- 81647	PB						
Diesel		None Detected					
- 81637	PB						
Oil & Grease		None Detected					

[1] = laboratory blank, e.g. PB etc.

4.0 REV 1 OF SURROGATE RECOVERIES  
CLP ORGANICS

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Laboratory NET

Sample Delivery Group 91056593 : 91064593

QA Reviewer/Firm cgk / PRC

Review Date 21. May 1991

Sample Matrix 8010

	QC LIMIT		<u>91056593</u>	<u>91056594</u>	<u>91056595</u>	<u>91056596</u>	<u>91054593</u>
	Water	Soil	Sample Number	Sample Number	Sample Number	Sample Number	Sample Number
VOLATILES			Surrogate Value	Surrogate Value	Surrogate Value	Surrogate Value	Surrogate Value
toluene-d8	88-110	81-117	97	97	108	107	97
bromofluorobenzene	86-115	74-121	101	98	86	103	97
1,2-dichloroethane-d4	76-114	70-121	95	73	97	108	83
			Qualifier	Qualifier	Qualifier	Qualifier	Qualifier
SEMIVOLATILES							
nitrobenzene-d5	35-114	35-TT4 <sup>23-120</sup>	61	83	59	56	80
2-fluorobiphenyl	43-116	<del>43-116</del> <sup>30-115</sup>	70	100	77	86	94
terphenyl-d14	33-141	<del>33-141</del> <sup>18-137</sup>	74	104	83	103	85
phenol-d5	10.0-94	<del>10.0-94</del> <sup>24-113</sup>	55	87	54	57	80
2-fluorophenol	21-100	<del>21-100</del> <sup>25-121</sup>	55	81	36	44	76
2,4,6-tribromophenol	10-123	<del>10-123</del> <sup>19-122</sup>	66	98	53	45	78
			Qualifier	Qualifier	Qualifier	Qualifier	Qualifier
PESTICIDES/PCBs							
dibutylchloroendate	24-154	20-150	95	80	58	120	18X
			Qualifier	Qualifier	Qualifier	Qualifier	Qualifier J

\* = Values outside of QC limits

# REVIEW OF SURROGATE RECOVERIES CLP ORGANICS

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Laboratory NET  
Sample Delivery Group 91056593; 9106H593  
QA Reviewer/Firm Cyle/PRC  
Review Date 21 May 1997  
Sample Matrix soil

	QC LIMIT		<u>9106H594</u>	<u>9106H595</u>	<u>9106H596</u>		
	Water	Soil	Sample Number	Sample Number	Sample Number	Sample Number	Sample Number
VOLATILES			Surrogate Value	Surrogate Value	Surrogate Value	Surrogate Value	Surrogate Value
toluene-d8	88-110	81-117	110	88	116		
bromofluorobenzene	86-115	74-121	88	121	76		
1,2-dichloroethane-d4	76-114	70-121	81	120	80		
			Qualifier	Qualifier	Qualifier	Qualifier	Qualifier
SEMIVOLATILES							
nitrobenzene-d5	35-114	<del>35-114</del> 13-120	88	19 *	63		
2-fluorobiphenyl	43-116	<del>43-116</del> 30-115	101	47	87		
terphenyl-d14	33-141	<del>33-141</del> 18-137	94	80	88		
phenol-d5	10.0-94	<del>10.0-94</del> 24-113	87	25	67		
2-fluorophenol	21-100	<del>21-100</del> 25-121	87	9.5 *	54		
2,4,6-tribromophenol	10-123	<del>10-123</del> 19-122	85	68	63		
			Qualifier	Qualifier (Not for positive or negative)	Qualifier	Qualifier	Qualifier
PESTICIDES/PCBs							
dibutylchloroendate	24-154	20-150	110	128	148		
			Qualifier	Qualifier	Qualifier	Qualifier	Qualifier

\* = Values outside of QC limits

4.1 REVIEW OF SURROGATE RECOVERIES  
non-CLP ORGANICS

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Laboratory NET

Sample Delivery Group 91056593, 91064593

QA Reviewer/Firm Cole / PRC

Review Date 21 May 1991

Sample Matrix Soil

QC LIMIT  
Water Soil

METHOD 8010

bromochloromethane

2-bromo-1-chloropropane

1,4-dichlorobutane


METHOD 8020

alpha, alpha, alpha,  
trifluorotoluene

--	--

TPH Gasoline

Bromofluorobenzene

50-150

50-150

91056593

Sample Number

91056594

Sample Number

91056595

Sample Number

91056596

Sample Number

91064593

Sample Number

Surrogate Value

Surrogate Value

Surrogate Value

Surrogate Value

Surrogate Value


Qualifier

Qualifier

Qualifier

Qualifier

Qualifier

--	--	--	--	--

Qualifier

Qualifier

Qualifier

Qualifier

Qualifier

<u>88</u>	<u>90</u>	<u>85</u>	<u>149</u>	<u>87</u>
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Qualifier

Qualifier

Qualifier

Qualifier

Qualifier

? = Values outside of QC limits

4.1 REVIEW OF SURROGATE RECOVERIES  
non-CLP ORGANICS

Page 14 of 26

Laboratory NET

Sample Delivery Group 91056593 : 9106H593

QA Reviewer/Firm Cyle / PRC

Review Date 21. May 1991

Sample Matrix Soil

QC LIMIT  
Water

Soil

METHOD 8010

bromochloromethane

2-bromo-1-chloropropane

1,4-dichlorobutane


METHOD 8020

alpha, alpha, alpha,-  
trifluorotoluene

--	--

TPH Gasoline

Bromofluorobenzene

50-150

50-150

9106H594

Sample Number

9106H595

Sample Number

9106H596

Sample Number

Sample Number

Sample Number

Surrogate Value

Surrogate Value

Surrogate Value

Surrogate Value

Surrogate Value


Qualifier\_\_

Qualifier\_\_

Qualifier\_\_

Qualifier\_\_

Qualifier\_\_

--	--	--	--	--

Qualifier\_\_

Qualifier\_\_

Qualifier\_\_

Qualifier\_\_

Qualifier\_\_

<u>21 *</u>	<u>79</u>	<u>35 *</u>		
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Qualifier J

Qualifier\_\_

Qualifier J

Qualifier\_\_

Qualifier\_\_

\* = Values outside of QC limits

5.0 REVIEW OF MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERIES AND RPDs  
CLP ORGANICS

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Laboratory NET  
Sample Delivery Group 910561593; 9106H593  
QA Reviewer/Firm CRK / PRC  
Review Date 22. May 1991  
Sample Matrix Soil

ADJUSTED AND QUALIFIED SAMPLES

	QC LIMITS (%R / %RPD)		<u>910561594</u> Sample Number			<u>- 81535</u> Lab Sample Number			<u>- 81539</u> Lab Sample Number		
	Water	Soil	MS %R	MSD %R	RPD	MS %R	MSD %R	RPD	MS %R	MSD %R	RPD
<b>VOLATILES (VOC)</b>											
1,1-dichloroethene	61-145/14	59-172/22				83	89	9.0	105	103	2.3
trichloroethene	71-120/14	62-137/23				90	94	4.3	98	98	<1
benzene	76-127/11	66-142/21				103	87	17	90	89	1.3
toluene	76-125/13	59-139/21				87	85	2.3	107	103	4.0
chlorobenzene	75-130/13	60-133/21				80	96	18	94	97	3.3
<b>SEMIVOLATILES (SOC)</b>											
phenol	12-89/42	26-90/35									
2-chlorophenol	27-123/40	25-102/50									
1,4-dichlorobenzene	36-97/28	28-104/27									
N-nitroso-di-n-propylamine	41-116/38	41-126/38									
1,2,4-trichlorobenzene	39-98/28	38-107/23									
4-chloro-3-methylphenol	23-97/42	26-103/33									
acenaphthene	46-118/31	31-137/19									
4-nitrophenol	10-80/50	11-114/50									
2,4-dinitrotoluene	24-96/38	28-89/47									
pentachlorophenol	9-103/50	17-109/47									
pyrene	26-127/31	35-142/36									
<b>PESTICIDES/PCBs</b>											
gamma-BHC (lindane)	56-123/15	46-127/50	142*	125	12						
heptachlor	40-131/20	35-130/31	231*	121	57*						
aldrin	40-120/22	34-132/43	98	88	10						
dieldrin	52-126/18	31-134/38	144*	117	21						
endrin	58-121/21	42-139/45	124	97	24						
4,4'-DDT	38-127/27	23-134/50	132	97	31						

\* = Values outside of QC limits

Laboratory NET

Sample Delivery Group 91056593 ; 91064593

QA Reviewer/Firm CAL / PRC

Review Date 22 May 1991

Sample Matrix Soil

ADJUSTED AND QUALIFIED SAMPLES

			-81543			91066605			-81677		
			Lab Sample Number			Sample Number			Lab Sample Number		
			QC LIMITS (%R / %RPD)								
			Water	Soil		MS %R	MSD %R	RPD	MS %R	MSD %R	RPD
<b>VOLATILES (VOC)</b>											
1,1-dichloroethene	61-145/14	59-172/22							88	91	3.1
trichloroethene	71-120/14	62-137/23							88	88	1.0
benzene	76-127/11	66-142/21							67	68	1.2
toluene	78-125/13	59-139/21							90	94	4.3
chlorobenzene	75-130/13	60-133/21							86	84	2.1
<b>SEMIVOLATILES (SOC)</b>											
phenol	12-89/42	26-90/35				50	54	7			
2-chlorophenol	27-123/40	25-102/50				55	55	0			
1,4-dichlorobenzene	36-97/28	28-104/27				53	52	2			
N-nitroso-di-n-propylamine	41-116/38	41-126/38				57	70	20			
1,2,4-trichlorobenzene	39-98/28	38-107/23				60	57	5			
4-chloro-3-methylphenol	23-97/42	26-103/33				57	59	3			
acenaphthene	46-118/31	31-137/19				63	61	3			
4-nitrophenol	10-80/50	11-114/50				67	30	76 *			
2,4-dinitrotoluene	24-96/38	28-89/47				59	42	34			
pentachlorophenol	9-103/50	17-109/47				64	49	27			
pyrene	26-127/31	35-142/36				65	62	5			
<b>PESTICIDES/PCBs</b>											
gamma-BHC (lindane)	58-123/15	46-127/50									
heptachlor	40-131/20	35-130/31									
aldrin	40-120/22	34-132/43									
dieldrin	52-126/18	31-134/38									
endrin	58-121/21	42-139/45									
4,4'-DDT	38-127/27	23-134/50									

\* = Values outside of QC limits



Laboratory NET  
Sample Delivery Group 91056593; 9106H593  
QA Reviewer/Firm Cal/PRC  
Review Date 22 May 1995  
Sample Matrix Soil

ADJUSTED AND QUALIFIED SAMPLES

	QC LIMITS (%R / %RPD)		<u>91066606</u> Sample Number			<u>9106H593</u> Sample Number			Sample Number		
	Water	Soil	MS %R	MSD %R	RPD	MS %R	MSD %R	RPD	MS %R	MSD %R	RPD
<b>VOLATILES (VOC)</b>											
1,1-dichloroethene	61-145/14	59-172/22									
trichloroethene	71-120/14	62-137/23									
benzene	76-127/11	66-142/21									
toluene	76-125/13	59-139/21									
chlorobenzene	75-130/13	60-133/21									
<b>SEMIVOLATILES (SOC)</b>											
phenol	12-89/42	26-90/35	78	77	1.3	79	73	7.9			
2-chlorophenol	27-123/40	25-102/50	63	61	3.2	78	71	9.4			
1,4-dichlorobenzene	36-97/28	28-104/27	64	59	8.1	72	71	1.4			
N-nitroso-di-n-propylamine	41-116/38	41-126/38	80	77	3.8	84	84	0.0			
1,2,4-trichlorobenzene	39-98/28	38-107/23	72	69	4.3	76	75	1.3			
4-chloro-3-methylphenol	23-97/42	26-103/33	86	85	1.2	83	79	4.9			
acenaphthene	46-118/31	31-137/19	74	74	0.0	81	77	2.5			
4-nitrophenol	10-80/50	11-114/50	98	99	1.0	104	100	3.9			
2,4-dinitrotoluene	24-96/38	28-89/47	88	88	0.0	85	82	3.6			
pentachlorophenol	9-103/50	17-109/47	95	100	5.1	63	63	0.0			
pyrene	26-127/31	35-142/36	71	75	5.5	72	71	1.4			
<b>PESTICIDES/PCBs</b>											
gamma-BHC (lindane)	56-123/15	46-127/50									
heptachlor	40-131/20	35-130/31									
aldrin	40-120/22	34-132/43									
dieldrin	52-126/18	31-134/38									
endrin	56-121/21	42-139/45									
4,4'-DDT	38-127/27	23-134/50									

\* = Values outside of QC limits

5.1 REVIEW F MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECLERIES AND RPDs  
NON-CLP ANALYTES

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Laboratory NET  
Sample Delivery Group 91056593 : 9106H593  
QA Reviewer/Firm CAU/PRC  
Review Date 22 May 1991  
Sample Matrix SOIL

QC LIMITS  
(%R / %RPD)

91056589  
Sample Number

ADJUSTED AND QUALIFIED SAMPLES  
-81525  
Lab Sample Number

91056591  
Sample Number

Water Soil

METHOD 8010

	Water	Soil
1,1-dichloroethane	61-145/14	59-172/22
chloroform		
bromodochloromethane		
trichloroethene	71-120/14	62-137/24
tetrachloroethene		
chlorobenzene	75-130/13	60-133/21

MS %R	MSD %R	RPD	MS %R	MSD %R	RPD	MS %R	MSD %R	RPD

METHOD 8020

	Water	Soil
toluene	76-125/13	59-139/21
benzene	76-127/11	66-142/21


	Water	Soil
TPH Diesel	50-150/50	50-150/50
TPH Gasoline	50-150/50	50-150/50

						83	102	9.9
102	112	9.1	96	91	5.3			

	Water	Soil
Oil and Grease	85-115/30	85-115/30

--	--	--	--	--	--	--	--	--

	Water	Soil
Chloride	50-150/50	50-150/50
Nitrate	50-150/50	50-150/50
Sulfate	50-150/50	50-150/50
o-Phosphate	50-150/50	50-150/50


	Water	Soil
Chromium VI	70-130/30	70-130/40

--	--	--	--	--	--	--	--	--

	Water	Soil
Total Dissolved Solids	70-130/15	NA

--	--	--	--	--	--	--	--	--

\* = Values outside of QC limits

# 5.1 REVIEW OF MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERIES AND RPDs NON-CL ANALYTES

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Laboratory NET

Sample Delivery Group 91056593 ÷ 9106H593

QA Reviewer/Firm CGL/PRC

Review Date 22 May 1997

Sample Matrix Soil

			9105H582			ADJUSTED AND QUALIFIED SAMPLES -81602			9105H585		
			Sample Number			Lab Sample Number			Sample Number		
	QC LIMITS (%R / %RPD)										
	Water	Soil	MS %R	MSD %R	RPD	MS %R	MSD %R	RPD	MS %R	MSD %R	RPD
<b>METHOD 8010</b>											
1,1-dichloroethene	61-145/14	59-172/22									
chloroform											
bromodochloromethane											
trichloroethene	71-120/14	62-137/24									
tetrachloroethene											
chlorobenzene	75-130/13	60-133/21									
<b>METHOD 8020</b>											
toluene	76-125/13	59-139/21									
benzene	76-127/11	66-142/21									
TPH Diesel	50-150/50	50-150/50									
TPH Gasoline	50-150/50	50-150/50				103	100	4.3	110	108	1.8
Oil and Grease	85-115/30	85-115/30	104	105	<1						
Chloride	50-150/50	50-150/50									
Nitrate	50-150/50	50-150/50									
Sulfate	50-150/50	50-150/50									
o-Phosphate	50-150/50	50-150/50									
Chromium VI	70-130/30	70-130/40									
Total Dissolved Solids	70-130/15	NA									

\* = Values outside of QC limits

# 3.1 REVIEW OF MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERIES AND RPDs NON-CL ANALYTES

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Laboratory NET  
Sample Delivery Group 91056593 & 9106H593  
QA Reviewer/Firm CGH/PRC  
Review Date 22 May 1997  
Sample Matrix Soil

## ADJUSTED AND QUALIFIED SAMPLES

	QC LIMITS (%R / %RPD)		<u>9106H596</u> Sample Number			<u>9106H604</u> Sample Number			Sample Number		
	Water	Soil	MS %R	MSD %R	RPD	MS %R	MSD %R	RPD	MS %R	MSD %R	RPD
METHOD 8010											
1,1-dichloroethene	61-145/14	59-172/22									
chloroform											
bromodochloromethane											
trichloroethene	71-120/14	62-137/24									
tetrachloroethene											
chlorobenzene	75-130/13	60-133/21									
METHOD 8020											
toluene	76-125/13	59-139/21									
benzene	76-127/11	66-142/21									
TPH Diesel	50-150/50	50-150/50	84	78	5.8						
TPH Gasoline	50-150/50	50-150/50									
Oil and Grease	85-115/30	85-115/30				105	100	4.9			
Chloride	50-150/50	50-150/50									
Nitrate	50-150/50	50-150/50									
Sulfate	50-150/50	50-150/50									
o-Phosphate	50-150/50	50-150/50									
Chromium VI	70-130/30	70-130/40									
Total Dissolved Solids	70-130/15	NA									

\* = Values outside of QC limits

## 6.0 REVIEW OF MATRIX DUPLICATES

Page 2 of 26Laboratory NET

Sample Delivery Group 91056593; 91064593

QA Reviewer/Firm CSK/PRC

Review Date 22 May 1991

Sample Matrix Soil

### QUALIFIED ASSOCIATED SAMPLES

**SAMPLE NUMBER**

**DUPLICATE SAMPLE NUMBER**

91056586

-81348

91056593

91056594

91056595

91056596

91056593   91056594   91056595   91056596   \_\_\_\_\_  
Sample Number   Sample Number   Sample Number   Sample Number   Sample Number

**Sample Number**

[illegible]

\* = RPD exceeds QAPP limit.

**# = RPD exceed Functional Guideline limit (CLP inorganics only)**

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Laboratory NET  
Sample Delivery Group 91056593: 9106H593  
QA Reviewer/Firm CAH/PRC  
Review Date 22. May 1991  
Sample Matrix Soil

SAMPLE NUMBER	9105H585
DUPLICATE SAMPLE NUMBER	-04434

9106H593   9106H594   9106H595   9106H596   \_\_\_\_\_  
Sample Number   Sample Number   Sample Number   Sample Number   Sample Number

[illegible]

\* = RPD exceeds QAPP limit.

# = RPD exceed Functional Guideline limit (CLP inorganics only)

## 7.0 REVI. OF BLANK SPIKES

Page 23 of 26Laboratory NETSample Delivery Group 91056593 & 9106H593QA Reviewer/Firm CGL/PRCReview Date 22 May 1991Sample Matrix SM

Lab Sample Number \_\_\_\_\_

## QUALIFIED ASSOCIATED SAMPLES

9106H593   9106H594   9106H595   9106H596  
 Sample Number   Sample Number   Sample Number   Sample Number   Sample Number

METHODS AND ANALYTES	T	A	%R	Criteria	Qualifier	Qualifier	Qualifier	Qualifier	Qualifier
-81345									
Metals	Limits Not Exceeded								
-81363									
Gasoline	Limits Not Exceeded								
-81523									
Pesticides/PCBs	Limits Not Exceeded								
-81527									
Gasoline	Limits Not Exceeded								
-81533									
Diesel	Limits Not Exceeded								
-81555									
Oil and grease	Limits Not Exceeded								
-81560									
Cyanide	Limits Not Exceeded								
// // // // // // // // //									
-84431									
Metals									
Calcium			159		14100 J	13500 J	4780 J	11600 J	
-81523									
Pesticides/PCBs	Limits Not Exceeded								
-81604									
Gasoline	Limits Not Exceeded								
-81645									
Gasoline	Limits Not Exceeded								

T=total concentration found in spiked sample.

A=actual spike concentration added to sample.

\* = exceeds QAPP limit

# = exceeds Functional Guideline Limit

**7.0 RE' N OF BLANK SPIKES**

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Laboratory NCI  
Sample Delivery Group 91056593 ; 91064593

QA Reviewer/Firm CAL / PRC

Review Date 22 May 1991

Sample Matrix Soil

**Lab Sample Number** \_\_\_\_\_

### QUALIFIED ASSOCIATED SAMPLES

**Sample Number   Sample Number   Sample Number   Sample Number   Sample Number**

[illegible]

**T=total concentration found in spiked sample.**

**A=actual spike concentration added to sample.**

\* = exceeds QAPP limit

# = exceeds Functional Guideline Limit



## 8.0 REVIEW OF MATRIX SPIKES

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Laboratory NET

Sample Delivery Group 91056593; 9106H593

QA Reviewer/Firm Cole PRC

Review Date 22. May 1997

Sample Matrix 5071

### QUALIFIED ASSOCIATED SAMPLES

91056593

91056594

91050595

91056596

**Sample Number**

**Sample Number**

**Sample Number**

**Sample Number**

**Sample Number**

**SAMPLE NUMBER**  
**& analytes outside of QC limits**

**% R**

**IDL**

**Value/Qualifier****Value/Qualifier****Value/Qualifier**

Value/Qualifier

Value/Qualifier

[illegible]

Page 26 of 26

Sample Matrix 5071

**Sample Number**

**Sample Number**

**Value/Qualifier**[illegible]

## QA/QC DATA REVIEW SUMMARY

### 1.0 QA\QC Narrative

Site: Hunters Point Annex (CTO 0106)  
Laboratory: NET Pacific, Inc.  
QA Reviewer: Ashish Goel, PRC  
Review Date: May 21, 1991

Batch No.: 9105G585 (NET Log Nos. 5849 and 5863)  
Sample No.: 9105G585 through 9105G592, and 9105H579 through 9105H582  
Analyses: Volatiles, semi-volatiles, pesticides/PCBs, metals (including molybdenum), cyanide, TPH diesel, TPH gasoline, oil and grease, and pH

Collection Date: January 28 through 30, 1991  
QC Criteria Reviewed: Holding time, laboratory blanks, surrogate recoveries, matrix spike/matrix spike duplicate, matrix duplicate and blind spike

The data were reviewed according to EPA documents "Laboratory Data Validation Functional Guidelines for Evaluating Organic Analyses" (February 1988) and "Laboratory Data Validation Functional Guidelines for Evaluating Inorganic Analyses" (July 1988).

### Comments

1. Due to blank contamination problems, the results for the following analytes are considered non-detected and estimated (UJ) and usable for limited purposes only.
  - Methylene chloride in samples 9105G589 through 9105G592, 9105H579 through 9105H582
  - Acetone in samples 9105G585, 9105G586, 9105G587, 9105H579, 9105H581 and 9105H582
  - bis(2-ethylhexyl)phthalate in samples 9105G586 through 9105G590
  - Heptachlor in samples 9105G586 through 9105G592, and 9105H579 through 9105H581

Methylene chloride and heptachlor were found in the laboratory blanks at concentrations of 5.4  $\mu\text{g}/\text{kg}$  and 16  $\mu\text{g}/\text{kg}$ , respectively. Acetone and bis(2-ethylhexyl)phthalate were not found in the laboratory blanks, but are considered common laboratory contaminants. Heptachlor has been found in other laboratory blanks at concentrations up to 210  $\mu\text{g}/\text{kg}$ . The quantitation limits for these samples may have been raised according to the blank qualification rules.

2. Due to holding time problems, the results for the following analytes are considered estimated (J) and usable for limited purposes only.
  - All volatile analytes in sample 9105G587
  - Mercury in samples 9105H585, 9105G586, 9105G587, 9105G589 and 9105G590
  - Cyanide in samples 9105H579 through 9105H582

The volatiles in sample 9105G587 were analyzed 25 days after the collection date. Cyanide and mercury were analyzed 1 day after the holding time. The results for this sample are considered estimates.

Technical holding times were met for the other analyses.

3. Due to accuracy problems, the results for the following analytes are considered estimates (J) and usable for limited purposes only.

- Antimony, chromium, manganese, and selenium in all samples analyzed

The matrix spike recoveries for antimony, chromium, manganese, and selenium were 20.8%, 55.9%, 67.6%, and 59.8%, respectively (75-125% QC limit). The results for these metals are biased low.

4. Due to precision problems, the results for the following analyte are considered estimates (J) and usable for limited purposes only.

- Mercury in all samples analyzed

The relative percent difference of mercury was 146% (20% QC limit) in the matrix duplicate sample.

5. The following problems were observed with the matrix spike/matrix spike duplicate (MS/MSD) and the blank spike samples.

- High percent recoveries of 139-395% for gamma-BHC, heptachlor, dieldrin, endrin, and 4,4'-DDT in the pesticide/PCB MS/MSD samples
- Poor relative percent differences (RPD) of 38-57% for heptachlor in the pesticide/PCB MS/MSD samples
- High recovery of 265% for heptachlor in the pesticide/PCB blank spike sample

These spike recovery problems are not expected to affect the sample results.

6. The surrogate recovery of 2-fluorophenol is 24% in sample 9105H582. This problem does not affect the data because only one semi-volatile surrogate was out of criteria.
7. All quality control criteria reviewed, other than those discussed above, were met and are considered acceptable. All other results are considered valid and usable for all purposes.

2.0 VIEW OF HOLDING TIMES  
ORGANIC CLP ANALYSES

NET Log # 1849 and 5863

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ANALYSIS AND EXTRACTION DATE/HOLDING TIME(S)

Laboratory NET

Sample Delivery Group 9105 G5 85

QA Reviewer/Firm PRC

Review Date 5-21-91

Sample Matrix SOILS

CLP SOC

(soil: extract 14 days

analyze 40 days

water: extract 7 days

analyze 40 days)

CLP Pesticides/PCBs

(soil: extract 14 days

analyze 40 days

water: extract 7 days

analyze 40 days)

CLP VOC

(14 days for soil and water)

Extract

Analyze

Extract

Analyze

Sample Number	Sample Date	CLP VOC (14 days for soil and water)	Extract	Analyze	Extract	Analyze
9105 G585	1-28-91	2-6-91	2-4-91	2-27-91	2-4-91	3-1-91
9105 G586	1-28-91	2-6-91	2-4-91	2-22-91	2-4-91	3-1-91
9105 G587	1-28-91	2-22-91 * (11)	2-4-91	2-27-91	2-4-91	3-1-91
9105 G588	1-29-91	2-09-91	2-4-91	2-22-91	2-4-91	3-1-91
9105 G589	1-28-91	2-09-91	2-4-91	2-22-91	2-4-91	3-1-91
9105 G590	1-28-91	2-09-91	2-4-91	2-22-91	2-4-91	3-1-91
9105 G591	1-30-91	2-11-91	2-9-91	3-15-91	2-9-91	3-8-91
9105 G592	1-30-91	2-11-91	2-9-91	3-13-91	2-9-91	3-8-91
9105 H579	1-29-91	2-10-91	2-9-91	3-13-91	2-9-91	3-8-91
9105 H580	1-29-91	2-10-91	2-9-91	3-13-91	2-9-91	3-8-91
9105 H581	1-29-91	2-10-91	2-9-91	3-13-91	2-9-91	3-8-91
9105 H582	1-29-91	2-11-91	2-9-91	3-15-91	2-9-91	3-8-91

\* = Holding Time exceeded

Note: all holding times in days

**2.1 REVIEW OF HOLDING TIMES**  
**INORGANIC CLP ANALYSES**

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Laboratory NET  
 Sample Delivery Group 9105 G 585  
 QA Reviewer/Firm PRC  
 Review Date 5-21-91  
 Sample Matrix SOILS

ANALYSIS DATE/HOLDING TIME

Sample Number	Sample Date	CLP Metals[1] (6 months)	CLP Mercury (211 days)	CLP Cyanide (14 days)
9105 G 585	1-28-91	3-6-91 → 4-18-91	2-26-91 (1) *	2-8-91
9105 G 586	1-28-91	3-6-91 → 4-18-91	2-26-91 *	2-8-91
9105 G 587	1-28-91	3-6-91 → 4-18-91	2-26-91 *	2-11-91
9105 G 588	1-29-91	3-6-91 → 4-18-91	2-26-91	2-11-91
9105 G 589	1-28-91	3-6-91 → 4-18-91	2-26-91 *	2-11-91
9105 G 590	1-28-91	3-6-91 → 4-18-91	2-26-91 *	2-11-91
9105 G 591	1-30-91	3-6-91 → 4-18-91	2-26-91	2-13-91
9105 G 592	1-30-91	3-6-91 → 4-18-91	2-26-91	2-13-91
9105 H 579	1-29-91	3-6-91 → 4-18-91	2-21-91	2-13-91 * (1)
9105 H 580	1-29-91	3-6-91 → 4-18-91	2-21-91	2-13-91 *
9105 H 581	1-29-91	3-6-91 → 4-18-91	2-21-91	2-13-91 *
9105 H 582	1-29-91	3-6-91 → 4-18-91	2-21-91	2-13-91 *

[1] = Including Molybdenum

\* = Holding Time exceeded

Note: all holding times in days

REVIEW OF HOLDING TIMES  
non-CLP INORGANICS ANALYSES

Page 3 of 24

Laboratory NET

Sample Delivery Group 9105 G585

QA Reviewer/Firm PRC

Review Date 5-21-91

Sample Matrix SOILS

ANALYSIS DATE/HOLDING TIME

Chromium VI  
soil: 7 days for extract;  
24 hours analysis  
water: 24 hour analysis

TDS  
(7 days)

Sample Number	Sample Date	Chloride (28 days)	Nitrate-N (48 hours)	Sulfate (28 days)	o-Phosphate (48 hours)	pH (72 hours)		
9105 G585	1-28-91					1-31-91		
9105 G586	1-28-91					1-31-91		
9105 G587	1-28-91					1-31-91		
9105 G588	1-29-91					1-31-91		
9105 G589	1-28-91					1-31-91		
9105 G590	1-28-91					1-31-91		
9105 G591	1-30-91					1-31-91		
9105 G592	1-30-91					1-31-91		
9105 H579	1-29-91					1-31-91		
9105 H580	1-29-91					1-31-91		
9105 H581	1-29-91					1-31-91		
9105 H582	1-29-91					1-31-91		

\* = Holding Time exceeded  
Note: all holding times in days.

2.3 REVIEW OF HOLDING TIMES  
non-CLP ORGANICS ANALYSES

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Laboratory NET

Sample Delivery Group 9105 G5B5

QA Reviewer/Firm PRC

Review Date 5-21-91

Sample Matrix SDLS

ANALYSIS AND/OR EXTRACTION DATE/HOLDING TIME

Sample Number	Sample Date	8010 (14 days)	BETX, 8020 (7 days)	TPH, Gasoline (7 days water, 14 days soil)	TPH, Diesel (14 days extract, 40 days analyze)		Oil and Grease (28 days)
					Extract	Analyze	
9105 G5B5	1-28-91			2-3-91	1-30-91	1-31-91	2-11-91
9105 G5B6	1-28-91			2-3-91	1-30-91	1-31-91	2-11-91
9105 G5B7	1-28-91			2-3-91	1-30-91	1-31-91	2-11-91
9105 G5B8	1-29-91			2-3-91	1-30-91	1-31-91	2-11-91
9105 G5B9	1-28-91			2-3-91	1-30-91	1-31-91	2-11-91
9105 G590	1-28-91			2-3-91	1-30-91	1-31-91	2-11-91
9105 G591	1-30-91			2-3-91	2-8-91	2-10-91	2-11-91
9105 G592	1-30-91			2-5-91	2-8-91	2-10-91	2-11-91
9105 H579	1-29-91			2-3-91	2-8-91	2-10-91	2-11-91
9105 H580	1-29-91			2-3-91	2-8-91	2-10-91	2-11-91
9105 H581	1-29-91			2-3-91	2-8-91	2-10-91	2-11-91
9105 H582	1-29-91			2-3-91	2-8-91	2-10-91	2-11-91

\* = Holding Time exceeded  
Note: all holding times in days.



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## ADJUSTED AND QUALIFIED SAMPLES

Lab. Blank Sample Number & detected analytes	Concentration ( <del>ug/L</del> )	5 or 10x Value	Sample Number: (Old value/New Value)	Sample Number: (Old value/New Value)	Sample Number: (Old value/New Value)	Sample Number: (Old value/New Value)	Sample Number: (Old value/New Value)
-------------------------------------------------	--------------------------------------	-------------------	-----------------------------------------	-----------------------------------------	-----------------------------------------	-----------------------------------------	-----------------------------------------

[illegible]

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## ADJUSTED AND QUALIFIED SAMPLES

[illegible]

### 3.1 LABORATORY BLANK REVIEW

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Laboratory NET  
Sample Delivery Group 9105 GSB5  
QA Reviewer/Firm PRC  
Review Date 5-21-91  
Sample Matrix SP/L5

## ADJUSTED AND QUALIFIED SAMPLES

9105 G 586  
Sample Number

9105G5B7  
Sample Number

91054588  
Sample Number

9105G589  
Sample Number

9105G590  
Sample Number

Lab. Blank Sample Number & detected analytes	Concentration (ug/l)	5 or 10x Value	Sample Number: (Old value/New Value)	Sample Number: (Old value/New Value)	Sample Number: (Old value/New Value)	Sample Number: (Old value/New Value)	Sample Number: (Old value/New Value)
-------------------------------------------------	-------------------------	-------------------	-----------------------------------------	-----------------------------------------	-----------------------------------------	-----------------------------------------	-----------------------------------------

[illegible]

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### ADJUSTED AND QUALIFIED SAMPLES

9105G 590  
Sample Number

(Old value/New Value)

Value

10/1/20

kg/kgμg/kg

μg/kg

μg/kg

μg/kg

[illegible]

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### QUALIFIED SAMPLES

[1] = laboratory blank, e.g. ICB,CCB,PB,etc.

### 3.4 LABORATORY BLANK REVIEW NON-CLP ANALYTES

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Laboratory NET

Sample Delivery Group 9105 G5B5

QA Reviewer/Firm PRC

Review Date 5-21-91

Sample Matrix SOILS

#### QUALIFIED SAMPLES

BLANK SAMPLE NUMBER & detected analytes	Blank Type[1]	Blank Concentration	Sample Number Value/Qualifier	Sample Number Value/Qualifier	Sample Number Value/Qualifier	Sample Number Value/Qualifier	Sample Number Value/Qualifier
- 81354	MB						
TPH Gas.		Not detected	} No	Samples Qualified			
- 81524	MB						
TPH Gas.		Not detected					
- 81440	MB						
TPH Diesel		ND					
- 81529	MB						
TPH Diesel		ND					
- 81458	MB						
Oil & Grease		ND					

[1] = laboratory blank, e.g. PB etc.

# 4.0 REVIEW OF SURROGATE RECOVERIES CLP ORGANICS

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Laboratory NET  
Sample Delivery Group 9105 G585  
QA Reviewer/Firm PRC  
Review Date 5-22-91  
Sample Matrix SOILS

	QC LIMIT		<u>9105 G585</u>	<u>9105 G586</u>	<u>9105 G587</u>	<u>9105 G588</u>	<u>9105 G589</u>	<u>9105 G59</u>
	Water	Soil	Sample Number	Sample Number	Sample Number	Sample Number	Sample Number	
VOLATILES			Surrogate Value	Surrogate Value	Surrogate Value	Surrogate Value	Surrogate Value	
toluene-d8	88-110	81-117	100	107	110	100	101	99
bromofluorobenzene	86-115	74-121	86	84	86	100	100	96
1,2-dichloroethane-d4	76-114	70-121	89	90	100	99	110	115
			Qualifier	Qualifier	Qualifier	Qualifier	Qualifier	
SEMIVOLATILES								
nitrobenzene-d5	35-114	<del>85-114</del> 23-120	78	64	87	93	76	83
2-fluorobiphenyl	43-116	<del>43-116</del> 30-115	78	70	84	101	90	94
terphenyl-d14	33-141	<del>33-141</del> 18-137	79	76	90	102	94	104
phenol-d5	10.0-94	<del>10.0-94</del> 21-113	75	52	86	90	76	82
2-fluorophenol	21-100	<del>21-100</del> 35-121	68	33	76	82	71	74
2,4,6-tribromophenol	10-123	<del>10-123</del> 19-122	61	34	73	112	95	109
			Qualifier	Qualifier	Qualifier	Qualifier	Qualifier	
PESTICIDES/PCBs								
dibutylchloroendate	24-154	20-150	86	92	91	88	94	75
			Qualifier	Qualifier	Qualifier	Qualifier	Qualifier	

\* = Values outside of QC limits

# 4.0 REVIEW OF SURROGATE RECOVERIES CLP ORGANICS

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Laboratory NET  
Sample Delivery Group 9105 G585  
QA Reviewer/Firm PRC  
Review Date 5-22-91  
Sample Matrix SOILS

	QC LIMIT		9105 G591	9105 G592	9105 H579	9105 H580	9105 H581	9105 H58
	Water	Soil	Sample Number	Sample Number	Sample Number	Sample Number	Sample Number	
VOLATILES			Surrogate Value	Surrogate Value	Surrogate Value	Surrogate Value	Surrogate Value	
toluene-d8	88-110	81-117	104	100	104	109	106	99
bromofluorobenzene	86-115	74-121	93	92	96	94	87	95
1,2-dichloroethane-d4	76-114	70-121	96	93	100	96	101	90
			Qualifier	Qualifier	Qualifier	Qualifier	Qualifier	
SEMIVOLATILES								
nitrobenzene-d5	35-114	35-114 <sup>23-120</sup>	62	63	97	85	72	61
2-fluorobiphenyl	43-116	43-116 <sup>30-115</sup>	74	77	110	91	84	69
terphenyl-d14	33-141	33-141 <sup>18-137</sup>	88	98	123	106	91	74
phenol-d5	10.0-94	10.0-94 <sup>24-113</sup>	48	65	94	82	73	46
2-fluorophenol	21-100	21-100 <sup>25-121</sup>	28	56	90	78	69	24
2,4,6-tribromophenol	10-123	10-123 <sup>14-122</sup>	20	47	86	76	69	20
			Qualifier	Qualifier	Qualifier	Qualifier	Qualifier	
PESTICIDES/PCBs								
diethylchlorodate	24-154	20-150	88	112	74	73	71	97
			Qualifier	Qualifier	Qualifier	Qualifier	Qualifier	

\* = Values outside of QC limits



# 4.1 REVIEW OF SURROGATE RECOVERIES non-CLP ORGANICS

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Laboratory NET  
Sample Delivery Group 9105 G585  
QA Reviewer/Firm PRC  
Review Date 5-22-91  
Sample Matrix SI/LS

	QC LIMIT	
	Water	Soil
METHOD 8010		
bromochloromethane		
2-bromo-1-chloropropane		
1,4-dichlorobutane		

METHOD 8020		
alpha,alpha, alpha,- trifluorotoluene		

TPH Gasoline		
Bromofluorobenzene	50-150	50-150

<u>9105 G585</u>	<u>9105 G586</u>	<u>9105 G587</u>	<u>9105 G588</u>	<u>9105 G589</u>	<u>9105 G590</u>
Sample Number	Sample Number	Sample Number	Sample Number	Sample Number	Sample Number
Surrogate Value	Surrogate Value	Surrogate Value	Surrogate Value	Surrogate Value	Surrogate Value
Qualifier__	Qualifier__	Qualifier__	Qualifier__	Qualifier__	Qualifier__
Qualifier__	Qualifier__	Qualifier__	Qualifier__	Qualifier__	Qualifier__
<u>83</u>	<u>84</u>	<u>83</u>	<u>92</u>	<u>89</u>	<u>87</u>
Qualifier__	Qualifier__	Qualifier__	Qualifier__	Qualifier__	Qualifier__

\* = Values outside of QC limits

# 4.1 REVIEW OF SURROGATE RECOVERIES non-CLP ORGANICS

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Laboratory NET  
Sample Delivery Group 9105 G585  
QA Reviewer/Firm PRC  
Review Date 5-22-91  
Sample Matrix SOILS

	QC LIMIT		<u>9105 G591</u>	<u>9105 G592</u>	<u>9105 H579</u>	<u>9105 H580</u>	<u>9105 H581</u>	<u>9105 H5</u>
	Water	Soil	Sample Number	Sample Number	Sample Number	Sample Number	Sample Number	
METHOD 8010			Surrogate Value	Surrogate Value	Surrogate Value	Surrogate Value	Surrogate Value	
bromochloromethane								
2-bromo-1-chloropropane								
1,4-dichlorobutane								
			Qualifier__	Qualifier__	Qualifier__	Qualifier__	Qualifier__	
METHOD 8020								
alpha,alpha, alpha,-trifluorotoluene								
			Qualifier__	Qualifier__	Qualifier__	Qualifier__	Qualifier__	
TPH Gasoline								
Bromofluorobenzene	50-150	50-150	84	74	80	77	82	84
			Qualifier__	Qualifier__	Qualifier__	Qualifier__	Qualifier__	

\* = Values outside of QC limits

5.0 REVIEW OF MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERIES AND RPDs  
CL- ORGANICS

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Laboratory NET  
Sample Delivery Group 9105 G5B5  
QA Reviewer/Firm PRC  
Review Date 5-22-91  
Sample Matrix SOILS

ADJUSTED AND QUALIFIED SAMPLES

	QC LIMITS (%R / %RPD)		9105 G5B5 Sample Number			Lab Sample No. - 81446 Sample Number			Lab Sample No. - 81450 Sample Number		
	Water	Soil	MS %R	MSD %R	RPD	MS %R	MSD %R	RPD	MS %R	MSD %R	RPD
<b>VOLATILES (VOC)</b>											
1,1-dichloroethene	61-145/14	59-172/22				95	92	2.8			
trichloroethene	71-120/14	62-137/23				93	93	< 1			
benzene	76-127/11	66-142/21				93	86	7.8			
toluene	76-125/13	59-139/21				93	95	2.1			
chlorobenzene	75-130/13	60-133/21				91	87	4.5			
<b>SEMIVOLATILES (SOC)</b>											
phenol	12-89/42	26-90/35							70	69	1.4
2-chlorophenol	27-123/40	25-102/50							60	60	0
1,4-dichlorobenzene	36-97/28	28-104/27							59	61	3.3
N-nitroso-di-n-propylamine	41-116/38	41-126/38							69	63	1.6
1,2,4-trichlorobenzene	39-98/28	38-107/23							67	69	2.9
4-chloro-3-methylphenol	23-97/42	26-103/33							72	74	2.7
acenaphthene	46-118/31	31-137/19							67	70	4.4
4-nitrophenol	10-80/50	11-114/50							84	85	1.2
2,4-dinitrotoluene	24-96/38	28-89/47							67	68	1.5
pentachlorophenol	9-103/50	17-109/47							72	69	4.3
pyrene	26-127/31	35-142/36							66	64	3.1
<b>PESTICIDES/PCBs</b>											
gamma-BHC (lindane)	56-123/15	46-127/50	169 *	149 *	12						
heptachlor	40-131/20	35-130/31	395 *	260 *	38 *						
aldrin	40-120/22	34-132/43	111	102	9						
dieldrin	52-126/18	31-134/38	158 *	139 *	13						
endrin	56-121/21	42-139/45	147 *	126	15						
4,4'-DDT	38-127/27	23-134/50	199 *	164 *	19						

\* = Values outside of QC limits

# 5.0 VIEW OF MATRIX SPIKE/MATRIX SPIKE DUPLICATION RECOVERIES AND RPDs CLP ORGANICS

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Laboratory NET  
Sample Delivery Group 9105 G505  
QA Reviewer/Firm PRC  
Review Date 5-22-91  
Sample Matrix SOILS

## ADJUSTED AND QUALIFIED SAMPLES

Lab Sample No.  
- 81535

Lab Sample No.  
- 81543

	QC LIMITS (%R / %RPD)		9105 G594 Sample Number			Sample Number			Sample Number		
	Water	Soil	MS %R	MSD %R	RPD	MS %R	MSD %R	RPD	MS %R	MSD %R	RPD
<b>VOLATILES (VOC)</b>											
1,1-dichloroethene	61-145/14	59-172/22				83	89	7			
trichloroethene	71-120/14	62-137/23				90	94	4.3			
benzene	76-127/11	66-142/21				103	87	17			
toluene	76-125/13	59-139/21				87	85	2.3			
chlorobenzene	75-130/13	60-133/21				80	96	18			
<b>SEMIVOLATILES (SOC)</b>											
phenol	12-89/42	26-90/35							50	54	7
2-chlorophenol	27-123/40	25-102/50							55	55	0
1,4-dichlorobenzene	36-97/28	28-104/27							53	52	2
N-nitroso-di-n-propylamine	41-116/38	41-126/38							57	70	20
1,2,4-trichlorobenzene	39-98/28	38-107/23							60	57	5
4-chloro-3-methylphenol	23-97/42	26-103/33							57	59	3
acenaphthene	46-118/31	31-137/19							62	61	3
4-nitrophenol	10-80/50	11-114/50							67	30	76
2,4-dinitrotoluene	24-96/38	28-89/47							59	42	34
pentachlorophenol	9-103/50	17-109/47							64	49	27
pyrene	26-127/31	35-142/36							65	62	5
<b>PESTICIDES/PCBs</b>											
gamma-BHC (lindane)	56-123/15	46-127/50	142 *	125	12						
heptachlor	40-131/20	35-130/31	231 *	121	57 *						
aldrin	40-120/22	34-132/43	98	88	10						
dieldrin	52-126/18	31-134/38	144 *	117	21						
endrin	56-121/21	42-139/45	124	97	24						
4,4'-DDT	38-127/27	23-134/50	132	97	31						

\* = Values outside of QC limits

# 5.1 REVIEW OF MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERIES AND RPDs NON-CLP ANALYTES

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Laboratory NET  
Sample Delivery Group 9105 G585  
QA Reviewer/Firm PRC  
Review Date 5-22-91  
Sample Matrix SOILS

## ADJUSTED AND QUALIFIED SAMPLES

	QC LIMITS (%R / %RPD)		<u>9105 G589</u> Sample Number			<u>9105 G588</u> Sample Number			<u>9105 G586</u> Sample Number		
	Water	Soil	MS %R	MSD %R	RPD	MS %R	MSD %R	RPD	MS %R	MSD %R	RPD
<b>METHOD 8010</b>											
1,1-dichloroethene	61-145/14	59-172/22									
chloroform											
bromodochloromethane											
trichloroethene	71-120/14	62-137/24									
tetrachloroethene											
chlorobenzene	75-130/13	60-133/21									
<b>METHOD 8020</b>											
toluene	76-125/13	59-139/21									
benzene	76-127/11	66-142/21									
TPH Diesel	50-150/50	50-150/50				98	95	3.1			
TPH Gasoline	50-150/50	50-150/50	102	112	9.1						
Oil and Grease	85-115/30	85-115/30							104	101	2.4
Chloride	50-150/50	50-150/50									
Nitrate	50-150/50	50-150/50									
Sulfate	50-150/50	50-150/50									
o-Phosphate	50-150/50	50-150/50									
Chromium VI	70-130/30	70-130/40									
Total Dissolved Solids	70-130/15	NA									

\* = Values outside of QC limits

# 5.1 VIEW OF MATRIX SPIKE/MATRIX SPIKE DUPLICATION RECOVERIES AND RPDs NON-CLP ANALYTES

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Laboratory NET  
Sample Delivery Group 9105 G 505  
QA Reviewer/Firm PRC  
Review Date 5-22-91  
Sample Matrix Soils

Lab Sample No. 81525 ADJUSTED AND QUALIFIED SAMPLES  
9105 G 591  
Sample Number Sample Number

9105 H 502  
Sample Number

	QC LIMITS (%R / %RPD)		Sample Number			Sample Number			Sample Number		
	Water	Soil	MS %R	MSD %R	RPD	MS %R	MSD %R	RPD	MS %R	MSD %R	RPD
<b>METHOD 8010</b>											
1,1-dichloroethene	61-145/14	59-172/22									
chloroform											
bromodochloromethane											
trichloroethene	71-120/14	62-137/24									
tetrachloroethene											
chlorobenzene	75-130/13	60-133/21									
<b>METHOD 8020</b>											
toluene	76-125/13	59-139/21									
benzene	76-127/11	66-142/21									
TPH Diesel	50-150/50	50-150/50				83	102	9.9			
TPH Gasoline	50-150/50	50-150/50	96	91	5.3						
Oil and Grease	85-115/30	85-115/30							104	105	<1
Chloride-	50-150/50	50-150/50									
Nitrate	50-150/50	50-150/50									
Sulfate	50-150/50	50-150/50									
o-Phosphate	50-150/50	50-150/50									
Chromium VI	70-130/30	70-130/40									
Total Dissolved Solids	70-130/15	NA									

\* = Values outside of QC limits

## J REVIEW OF MATRIX DUPLICATES

Page 19 of 24Laboratory NET

Sample Delivery Group 9105G585

QA Reviewer/Firm PRC

Review Date 5-22-91

Sample Matrix SOILS

### QUALIFIED ASSOCIATED SAMPLES

**SAMPLE NUMBER**

**DUPLICATE SAMPLE NUMBER**

~~SEE BELOW~~

Sample Number	Sample Number	Sample Number	Sample Number	Sample Number
---------------	---------------	---------------	---------------	---------------

[illegible][illegible]

\* = RPD exceeds QAPP limit.

# = RPD exceed Functional Guideline limit (CLP inorganics only)

## 7.0 REVIEW OF BLANK SPIKES

Page 20 of 24Laboratory NET

Sample Delivery Group 9105-G585

QA Reviewer/Firm PRC

Review Date 5-22-91

Sample Matrix SOILS

Lab Sample Number (SEE BELOW)

### QUALIFIED ASSOCIATED SAMPLES

Sample Number   Sample Number   Sample Number   Sample Number   Sample Number

[illegible]

**T=total concentration found in spiked sample.**

**A=actual spike concentration added to sample.**

\* = exceeds QAPP limit

# = exceeds Functional Guideline Limit



## REVIEW OF BLANK SPIKES

Page 21 of 21Laboratory NET

Sample Delivery Group 9105 G585

QA Reviewer/Firm PRC

Review Date 5-22-91

Sample Matrix soils

Lab Sample Number (SEE BELOW)

### QUALIFIED ASSOCIATED SAMPLES

Sample Number	Sample Number	Sample Number	Sample Number	Sample Number
---------------	---------------	---------------	---------------	---------------

T=total concentration found in spiked sample.

**A=actual spike concentration added to sample.**

\* = exceeds QAPP limit

# = exceeds Functional Guideline Limit

## Metals:

Page 22 of 24

Laboratory NET  
Sample Delivery Group 9105 G5B5  
QA Reviewer/Firm PRC  
Review Date 5-22-91  
Sample Matrix 50125

### QUALIFIED ASSOCIATED SAMPLES

91056585      91056586      91056587      91056588      91056589  
Sample Number      Sample Number      Sample Number      Sample Number      Sample Number

SAMPLE NUMBER & analytes outside of QC limits	% R	IDL	Value/Qualifler	Value/Qualifler	Value/Qualifler	Value/Qualifler	Value/Qualifler
--------------------------------------------------	-----	-----	-----------------	-----------------	-----------------	-----------------	-----------------

[illegible]

## 8.0 REVIEW OF MATRIX SPIKES

### CLP INORGANICS

Page 23 of 24

Laboratory NET  
Sample Delivery Group 91056585  
QA Reviewer/Firm PRC  
Review Date 5-22-91  
Sample Matrix Soils

### QUALIFIED ASSOCIATED SAMPLES

91056 590

9105G591

9105G592

9105 H579

9105H580

**Sample Number**

**Sample Number**

**Sample Number**

**Sample Number**

**Sample Number**

**SAMPLE NUMBER**  
**& analytes outside of QC limits**

**% R**

**IDL**

Value/Qualifier

Value/Qualifier

Value/Qualifier

Value/Qualifier

Value/Qualifier

[illegible]

## 8.0 REVIEW OF MATRIX SPIKES

### CLP INORGANICS

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Laboratory NET

Sample Delivery Group 91056585

QA Reviewer/Firm PRI

Review Date 5-27-91

Sample Matrix Soil

### QUALIFIED ASSOCIATED SAMPLES

9105H581

9105H582

**Sample Number**

**Sample Number**

**Sample Number**

**Sample Number**

**Sample Number**

**SAMPLE NUMBER**  
**& analytes outside of QC limits**

**% R**

## IDL

Value/Qualifier

Value/Qualifier

**Value/Qualifier**

Value/Qualifier

Value/Qualifier

[illegible]

**FULL CLP VALIDATION REPORTS**

PRC Environmental Management, Inc.  
120 Howard Street  
Suite 700  
San Francisco, CA 94105  
415-543-4880  
Fax 415-543-5480



Received 8/21  
CTM

August 20, 1991

Carlene Merey  
Harding Lawson Associates  
7655 Redwood Blvd.  
P.O. Box 578  
Novato, CA 94948

Re: Data Validation Reports and Summaries, PA-16 and PA-18, Hunters Point  
Annex

Dear Ms. Merey,

Enclosed are your copies of the data validation reports and summaries for the pesticide/PCB and volatile data. The semi-volatile validation summary is also included as a draft pending the validation of sample 9107X054.

The validation summaries are prepared to make the task of qualifying the data easier. The summaries include those problems which should be generally applied to the samples in the specified group, all PA-16 and PA-18 samples in this case. The summaries are followed by the validation reports prepared for individual samples.

If you have any questions, please contact Santiago Lee or me at 415/543-4880.

Sincerely,

A handwritten signature in cursive script that reads "Thorsten Anderson".

Thorsten Anderson  
QA Chemist

## DATA VALIDATION SUMMARY

Samples Validated: 9105G589, 9105G592, 9106G601, 9106H592 and 9107X054  
Samples Applied To: All sample analyzed for areas PA-16 and PA-18  
Date Samples Collected: January 28 through February 14, 1991  
Matrices: Soil and water  
  
Analysis: CLP Pesticides/PCBs  
  
Date Validated: August 19, 1991  
QC Criteria Validated: Holding time, laboratory blanks, surrogate recoveries, matrix spike/matrix spike duplicate, initial and continuing calibration response factors and percent differences, internal standard areas and retention times, and instrument tunes.

The data were validated according to EPA documents "Laboratory Data Validation Functional Guidelines for Evaluating Organic Analyses" (February 1988).

### COMMENTS

1. Due to blank contamination problems, the results for the following analytes are considered non-detected and estimated (UJ) and usable for limited purposes only.

- All detected heptachlor results in all samples

Heptachlor was present in the laboratory blanks at concentrations of 4.4 µg/kg to 210 µg/kg. The sample quantitation limits should be raised according to the blank qualification guidelines.

2. Due to linearity problems in the initial calibration, the results for the following analytes are considered estimated (J) and usable for limited purposes only.

- All pesticide/PCB analytes in all samples

The 10% relative standard deviation (RSD) QC limit for linearity were exceeded for all four linearity check compounds.

	<u>RSD</u>
aldrin	14.3-23.7%
endrin	13.6-24.0%
4,4'-DDT	10.3-25.8%
DBC	11.1-19.6%

3. High percent recoveries of 137-416% were observed in the pesticide/PCB matrix spike, matrix spike duplicate and blank spike samples.

- All pesticide/PCB analytes in all samples are considered estimated (J) and usable for limited purposes only.

The high percent recoveries were the result of laboratory interferences that were observed in the spike samples, and the laboratory blank samples. Most of these interferences were not confirmed by the second column analysis and therefore not reported as detected in the laboratory blank. However, the extensive contamination could possibly 1) obscure low levels of pesticides/PCBs present in the samples (false negatives), and 2) cause a high bias for any pesticides/PCBs detected in the samples.

4. The reviewer found possible calculation mistakes for samples 9105G589 and 9106H592, as well as some matrix spike and blank spike samples. Only heptachlor was detected in the samples and it is already qualified as non-detected due to laboratory contamination problems.
5. Comments concerning breakdown, retention times and continuing calibrations do not affect the data. Other comments made in the validation reports apply only to individual samples.



## QA/QC DATA VALIDATION REPORT

### 1.0 QA/QC Narrative

Site: Hunters Point Annex

Laboratory: National Environmental Testing (NET)

QA Validation: Christine Snyder and Donna Melvin, and Angela Bennett, STS

Validation Date: August 7, 1991

Batch No.: 9105G589

Sample No.: 9105G589, 9105G592, 9106G601, 9106H592

Analyses: Pesticide/PCB

QC Criteria Validated: Holding time, laboratory blanks, surrogate recoveries, matrix spike/matrix spike duplicate, blank spike, GC column linearity, breakdown, calibration and DBC shift.

The data were validated according to EPA documents "Laboratory Data Validation Functional Guidelines for Evaluating Organic Analyses" (February 1988).

### COMMENTS

- Due to blank contamination problems, the results for the following analytes are considered non-detected and estimated (UJ) and usable for limited purposes only.
  - heptachlor in all samplesHeptachlor was present in the laboratory blanks at concentrations from 4.4 to 210 ug/kg.
- According to the case narratives submitted by the laboratory, the correct injection volume is 2.0 uL on columns DB608A4273 and DB608A4274. The data submitted lists 1.0 uL on the system printouts and sometimes was hand corrected to 2.0 uL for injections made on March 1, 1991 through March 4, 1991. When the 2.0 uL injection volume was used in the calculations, the results were one half of the values reported on the forms. The following samples were affected: 9105G589, 9106H592, PBLK11, PBLK12, PBLK12MS, PBLK12MSD, PBLK11MS, PBLK11MSD, and ZZZZZMS, ZZZZZMSD from both sets.
- The matrix spike/matrix spike duplicate percent recoveries and relative percent differences (RPDs) exceeding criteria are listed in the following table. The sample results are not affected.

COMPOUND	QC LIMITS	ZZZZZ			ZZZZZA	
		MS	MSD	RPD	MS	RPD
gamma-BHC	46-127/50	168	148	OK	142	OK
heptachlor	35-130/31	416	285	37	231	63
dieldrin	31-134/38	162	141	OK	143	OK
endrin	42-139/45	213	183	OK	OK	OK
4,4'-DDT	23-134/50	187	153	OK	OK	OK

<u>COMPOUND</u>	<u>QC LIMITS</u>	<u>MSD</u>	<u>MS</u>	<u>MSD</u>	<u>RPD</u>
		<u>MSD</u>	<u>MS</u>	<u>MSD</u>	<u>RPD</u>
gamma-BHC	46-127/50	OK	134	149	OK
heptachlor	35-130/31	OK	10	29	97
aldrin	34-132/43	133	OK	OK	OK

4. Due to column linearity problems, the following analytes are considered estimated (J) and usable for limited purposes only.

o All pesticide/PCB analytes in all samples

The 10% RSD QC limits for linearity were exceeded as follows:

aldrin	14.3 - 23.7%
endrin	13.6 - 24.0%
4,4'-DDT	10.3 - 25.8%
DBC	11.1 - 19.6%

5. The 20% QC limits for endrin and 4,4'-DDT breakdown were exceeded as follows:

endrin	20.8 - 27.2%
4,4'-DDT	27.6 - 62.3%

Endrin, 4,4'-DDT, endrin ketone, 4,4'-DDD, and 4,4'-DDE were not detected in any of the samples, therefore, no compounds are qualified.

6. The percent difference criteria of 15% for a quantitation column was exceeded as follows:

<u>COMPOUND</u>	<u>% D</u>
aldrin	15.6 - 59.3
endosulfan I	17.0
endosulfan II	18.8 - 23.1
endrin ketone	16.8 - 20.7
alpha-chlordane	16.5
4,4'-DDT	16.3 - 30.3
methoxychlor	16.2 - 60.7
endrin	16.3 - 30.9
4,4'-DDD	19.6 - 34.2
delta-BHC	16.2 - 23.2
gamma-BHC	15.9 - 18.1
heptachlor	15.4 - 20.0
beta-BHC	20.3
4,4'-DDE	23.7
endosulfan sulfate	16.2

The percent difference criteria of 20% for a confirmation column was exceeded as follows:

<u>COMPOUND</u>	<u>%D</u>
4,4'-DDT	29.7 - 46.0
methoxychlor	29.9 - 56.7
aldrin	24.4 - 33.4
delta-BHC	25.1 - 43.7
heptachlor epoxide	21.0

Due to the calibration criteria not being met, the following analytes are considered estimated (J) and usable for limited purposes only.

o heptachlor in samples 9106G601 and 9106H592

The remaining compounds listed above were not detected in the samples and were not qualified.

7. The retention time of the following analytes in the continuing calibration standards fell outside the laboratory calculated retention time windows by less than 0.3%.

- o endosulfan I in Ind A on 3/14/91 at 1723 (DB608)
- o endrin ketone in Ind B on 3/14/91 at 2108 (DB608)
- o endrin, 4,4'-DDD and endrin ketone in Ind B on 3/7/91 at 948 (DB17)
- o heptachlor, heptachlor epoxide, endosulfan I, dieldrin, endosulfan II, 4,4'-DDT, and methoxychlor in Ind A on 3/7/91 at 1742 (DB17)
- o beta-BHC, delta-BHC, aldrin, 4,4'-DDE, endrin, 4,4'-DDD, endosulfan sulfate, endrin ketone, alpha-chlordane and gamma-chlordane in Ind B on 3/8/91 at 136 (DB17)
- o gamma-BHC, heptachlor, aldrin, heptachlor epoxide, endosulfan I, dieldrin, endosulfan II, 4,4'-DDT, methoxychlor in Ind A on 3/8/91 at 929 (DB17)
- o 4,4'-DDE, endrin, 4,4'-DDD, endosulfan sulfate, endrin ketone, alpha-chlordane and gamma-chlordane in Ind B on 3/8/91 at 1014 (DB17)

The retention times for the compounds must be within the retention time windows to allow for identification of the analytes.

8. The percent recovery for the following analytes exceeded the QC limits of 30-140% in the blank spike samples.

<u>COMPOUND</u>	<u>PBLK11MS</u>	<u>PBLK11MSD</u>	<u>PBLK11AMSD</u>
gamma-BHC	OK	142	142
heptachlor	267	252	202
endrin	143	172	OK

<u>COMPOUND</u>	<u>PBLK12MS</u>	<u>PBLK12MSD</u>	<u>PBLK12AMSD</u>
heptachlor	180	420	179
aldrin	173	OK	OK
4,4'-DDT	231	OK	OK

9. All quality control criteria, other than those discussed above, were met and are considered acceptable. All other results are considered valid and usable for all purposes.

# QA/QC DATA VALIDATION REPORT

## 1.0 QA/QC Narrative

Site: Hunters Point Annex PA-16

Laboratory: National Environmental Testing (NET)

QA Reviewer: Angela Bennett

Validation Date: August 9, 1991

Batch No.: 9107X054

Sample No.: 9107X054

Analyses: Pesticide/PCB

QC Criteria Validated: Holding time, laboratory blanks, surrogate recoveries, matrix spike/matrix spike duplicate, blank spike, and GC column linearity, breakdown, calibration, retention time, DBC shift.

The data were reviewed according to EPA documents "Laboratory Data Validation Functional Guidelines for Evaluation Organic Analyses" (February 1988).

## COMMENTS

1. The matrix spike/matrix spike duplicate percent recoveries and relative percent differences (RPDs) exceeding criteria are listed in the following table for pesticide fractions. The sample results are not affected.

<u>COMPOUND</u>	<u>MSD</u>	<u>RPD</u>	<u>LIMITS</u>
dieldrin	138	19	18/52-126
endrin	137	OK	21/56-121

2. The percent recovery for the following analytes exceeded the QC limits of 30-140% in blank spike sample PBLK13MSD.

<u>COMPOUND</u>	<u>%REC</u>
gamma-BHC(lidane)	146
dieldrin	149
endrin	151
4,4'-DDT	148

3. Linearity for the following compounds exceeded the QC limit of 10%.

<u>COMPOUND</u>	<u>%RSD</u>
aldrin	16.7
endrin	15.7
4,4'-DDT	14.6

The following compounds are estimated (J) and are usable for limited purposes only.

- o all pesticide analytes in sample 9107X054

4. The following analytes exceeded the 15% difference criteria in the Individual A standard analyzed on 3/14/91 at 0416.

<u>COMPOUND</u>	<u>%D</u>
4,4'-DDT	19.1
methoxychlor	21.0

These compounds were not found in the sample, therefore no compounds were qualified.

5. All quality control criteria, other than those discussed above, were met and are considered acceptable. All other results are considered valid and usable for all purposes.

## DATA VALIDATION SUMMARY

Samples Validated: 9105G589, 9105G592, 9106G601, 9106H592 and 9107X054  
Samples Applied To: All sample analyzed for areas PA-16 and PA-18  
Date Samples Collected: January 28 through February 14, 1991  
Matrices: Soil and water

Analysis: CLP Volatiles

Date Validated: August 19, 1991  
QC Criteria Validated: Holding times, laboratory blanks, surrogate recoveries, matrix spike/matrix spike duplicate, initial and continuing calibration response factors and percent differences, internal standard areas and retention times, and instrument tunes.

The data were validated according to EPA documents "Laboratory Data Validation Functional Guidelines for Evaluating Organic Analyses" (February 1988).

### COMMENTS

1. Trans-1,3-dichloropropene was incorrectly identified in the initial and continuing calibrations. The cis isomer should elute 1-2 minutes earlier than the trans isomer. The laboratory identified the trans isomer eluting at the same retention time and having the same area as cis-1,3-dichloropropene.
  - The results for trans-1,3-dichloropropene in all samples are considered rejected (R) and unusable for any purposes.

It must be assumed that any trans-1,3-dichloropropene present in the samples would not have been identified because of the misidentification in the calibrations.

2. 4-Methyl-2-pentanone elutes approximately 1 1/2 minutes before 2-hexanone in the volatile calibrations with the column and instrument used. The laboratory reversed the identification of the elution order of these two compounds in all volatile calibrations.
  - For detected results of 4-methyl-2-pentanone or 2-hexanone the results should be listed as 4-methyl-2-pentanone and/or 2-hexanone, and qualified estimated (J)

The identity of these two compounds may be confused, even with the mass spectra. If these compounds were not found in the samples, the samples do not need qualification.

3. Sample 9106H592 was reanalyzed due to surrogate recovery problems. The reanalyzed sample 9106H592RE was analyzed 1 day out of the holding time criteria, but had no surrogate recovery problems. The laboratory reported results from the reanalysis.
  - The results are considered estimated (J) in sample 9106H592RE because the holding time was exceeded by 1 day.

The surrogate recovery for sample 9106H592 was reported incorrectly as 40% for 1,2-dichloroethane-d4 in the data summary package and data review report. The correct recovery is 81% and no qualification based on surrogate recovery is needed for this sample.

4. The concentrations for the tentatively identified compounds (TIC) reported in samples 9105G589 and 9105G592 were two times the values calculated by the validators using the raw data submitted. This problem should not have a major impact on the data since the TIC concentrations are always considered tentatively identified and estimated (NJ).
5. Other comments made in the validation reports apply only to individual samples or do not affect any sample results.

## QA/QC DATA VALIDATION REPORT

### 1.0 QA/QC Narrative

Site: Hunters Point Annex

Laboratory: National Environmental Testing (NET)

QA Validator: Christine Snyder and Donna Melvin

Validation Date: August 14, 1991

Batch No.: 9106G601

Sample No.: 9106G601, 9106H592, 9107X054

Analyses: Volatile

QC Criteria Validated: Holding time, laboratory blanks, surrogate recoveries, matrix spike/matrix spike duplicate, instrument tunes, sample internal standard areas and retention times, sample compound relative retention times, initial and continuing calibration response factors and percent differences.

The data were validated according to EPA documents "Laboratory Data Validation Functional Guidelines for Evaluating Organic Analyses" (February 1988).

### COMMENTS

1. Due to blank contamination problems, the results for the following tentatively identified compounds are considered estimated, non-detected, and tentatively identified (JNU) and the following target compounds are considered estimated and non-detected. The listed compounds are usable for limited purposes only.

- o TIC at approximate retention time 2.21 in samples 9107X054, 9106G601, 9106H592RE
- o TIC at approximate retention time 20.86 in samples 9106G601, 9106H592RE
- o TIC at approximate retention time 4.74 in sample 9106G601
- o TICs at approximate retention times 21.55, 22.45, 22.61, 24.10, 24.79 in sample 9106H592
- o methylene chloride in sample 9106G601

These analytes were found in the laboratory blanks at the following concentrations:

Tentatively identified compounds 39-140 ug/L, 30-51 ug/Kg

Methylene chloride was not found in the soil laboratory blanks associated with these samples but is considered a common laboratory contaminant. The result for this compound are considered non-detected and estimated (UJ).

2. Due to holding time problems, the following analytes are considered estimates (J) and usable for limited purposes.

- o All volatile analytes in sample 9106H592RE

The 14 day holding time for this sample was exceeded by 1 day.

3. Due to surrogate recovery problems, the results for the following analytes are considered estimated (J) and usable for limited purposes only.

o All volatile analytes in sample 9106H592

The following table lists the surrogates exceeding the QC limits:

<u>Surrogate</u>	<u>QC Limits</u>	<u>9106H592</u>
toluene-d8	81-117	123
bromofluorobenzene	74-121	70

What was the RE?

4. The matrix spike/matrix spike duplicate percent recoveries and relative percent differences (RPDs) exceeding criteria are listed in the following table. The sample results are not affected.

<u>COMPOUND</u>	<u>QC LIMITS</u>	<u>XXXXX A</u>		<u>XXXXX*</u>
		<u>MSD</u>	<u>RPD</u>	<u>RPD</u>
toluene	59-139/21	156	32	OK
1,1-dichloroethene	59-172/22	OK	OK	31

\* The matrix spike duplicate results were not reported for sample XXXXXMSD due to internal standard areas being low, but the percent recoveries were within criteria.

5. Raw data was not submitted for the BFB tune on 1/21/91 at 8:36 on Instrument 5970C, therefore, it could not be verified. The results reported on the Form 5A were within criteria, so no samples were qualified.
6. The laboratory incorrectly identified cis- and trans- 1,3-dichloropropene in the volatile calibrations. Cis-1,3-dichloropropene elutes over 1 minute earlier than trans-1,3-dichloropropene. The laboratory reversed the identification of the elution order on Instrument Volatiles A and identified both isomers at the retention time of cis-1,3-dichloropropene and having the same area on Instrument C. Because a retention was not established for trans-1,3-dichloropropene on Instrument C, the results for this compound are considered unusable (R) in samples 9107X054 and 9106H592.

Also, the laboratory reversed the identification of the elution order of 4-methyl-2-pentanone and 2-hexanone in all volatile calibrations. 2-Hexanone elutes approximately 1 1/2 minutes after 4-methyl-2-pentanone in the volatile calibrations. These compounds were not present in any samples associated with these calibrations, therefore, no compounds were qualified.

7. All quality control criteria, other than those discussed above, were met and are considered acceptable. All other results are considered valid and usable for all purposes.



## QA/QC DATA VALIDATION REPORT

### 1.0 QA/QC Narrative

Site: Hunters Point Annex

Laboratory: National Environmental Testing (NET)

QA Validator: Christine Snyder and Donna Melvin

Validation Date: August 12, 1991

Batch No.: 9105G589

Sample No.: 9105G589, 9105G592

Analyses: Volatiles

QC Criteria Validated: Holding time, laboratory blanks, surrogate recoveries, matrix spike/matrix spike duplicate, initial and continuing calibration response factors and percent differences, internal standard areas and retention times, instrument tunes.

The data were validated according to EPA documents "Laboratory Data Validation Functional Guidelines for Evaluating Organic Analyses" (February 1988).

### COMMENTS

1. Due to blank contamination problems, the results for the following analytes are considered non-detected and estimated (UJ) and usable for limited purposes only.

- o methylene chloride in samples 9105G589 and 9105G592
- o all tentatively identified compounds in samples 9105G589 and 9105G592

Methylene chloride was found in the laboratory blanks at concentrations of 4-6 ug/kg. The TIC's were found in the blanks at concentrations of 6-45 ug/kg.

2. The concentrations for the tentatively identified compounds reported in both samples were two times the values calculated by the validators using the data submitted.

3. Trans-1,3-dichloropropene was incorrectly identified in the initial and continuing calibrations. This cis isomer should elute 1-2 minutes earlier than the trans isomer. The laboratory identified the trans isomer eluting at the same retention time and having the same area as cis-1,3-dichloropropene. Because of the misidentification of trans-1,3-dichloropropene, the results for this compound are unusable (R) in both samples.

In addition, 4-methyl-2-pentanone elutes approximately 1 1/2 minutes before 2-hexanone in the volatile calibrations. The laboratory reversed the identification of the elution order of these two compounds in all volatile calibrations. These compounds were not found in the samples, therefore no samples were qualified.

4. All quality control criteria, other than those discussed above, were met and are considered acceptable. All other results are considered valid and usable for all purposes.

**DRAFT pending validation of sample 9107X054**

**DATA VALIDATION SUMMARY**

Samples Validated:	9105G589, 9105G592, 9106G601, 9106H592 and 9107X054
Samples Applied To:	All sample analyzed for areas PA-16 and PA-18
Date Samples Collected:	January 28 through February 14, 1991
Matrices:	Soil and water
Analysis:	CLP Semi-volatiles
Date Validated:	August 19, 1991
QC Criteria Validated:	Holding times, laboratory blanks, surrogate recoveries, matrix spike/matrix spike duplicate, instrument tunes, instrument response factors and percent differences, and internal standard areas and retention times

The data were validated according to EPA documents "Laboratory Data Validation Functional Guidelines for Evaluating Organic Analyses" (February 1988).

**COMMENTS**

1. Tentatively identified compounds (TIC) were present in the laboratory blanks at concentrations of 200  $\mu\text{g/kg}$  to 10,000  $\mu\text{g/kg}$ . The retention times of these TICs in the blanks were 5.02-5.30, 6.40-6.66, 17.20, 21.60, 23.37, 25.40, 27.37, 33.04, and 33.57 minutes.

- Any samples containing TICs labeled as "unknown" within 0.10 minutes of these retention times should be considered non-detected (U)

This problem should not have a major impact on the data since the TIC concentrations are always considered tentatively identified and estimated (NJ).

2. Other comments made in the validation reports apply only to individual samples or do not affect any data.

## QA/QC DATA VALIDATION REPORT

### 1.0 QA/QC Narrative

Site: Hunters Point Annex (CTO No. 0057)  
Laboratory: National Environmental Testing (NET)  
QA Validator: Christine Snyder and Donna Melvin  
Validation Date: August 17, 1991  
Batch No.: 9105G589  
Sample No.: 9105G589, 9105G592, 9106G601, 9106H592  
Analyses: Semivolatiles  
QC Criteria Validated: Holding times, laboratory blanks, surrogate recoveries, matrix spike/matrix spike duplicate, instrument tune, internal standard areas and retention times. Instrument calibrations response factors and percent differences.

The data were validated according to EPA documents "Laboratory Data Validation Functional Guidelines for Evaluating Organic Analyses" (February 1988).

### COMMENTS

1. Due to blank contamination problems, the results for the following tentatively identified compounds (TIC) are considered non detected and estimated (NJU) and usable for limited purposes only.
  - o TIC at retention times 5.19, 5.21, 33.26 in sample 9105G589
  - o TIC at retention times 5.05, 6.43, 25.01, 33.04 in samples 9105G592
  - o TIC at retention times 5.10, 25.94, 33.36 in sample 9106G601
  - o TIC at retention times 5.13, 5.15, in sample 9106H592

These TIC's were present in the blanks at concentrations 200 ug/kg to 10000 ug/kg.
2. Laboratory did not report the presence of a peak (greater than 10% of the nearest internal standard) at retention time 26.44 in sample 9105G592. The concentration of this tentatively identified compound is approximately 176 ug/Kg.
3. The matrix spike/matrix spike duplicate relative percent difference QC limit of 50% for 4-nitrophenol was exceeded for samples ZZZZBMS/MSD (76%).
4. All quality control criteria, other than those discussed above, were met and are considered acceptable. All other results are considered valid and usable for all purposes.

PRC Environmental Management, Inc.  
120 Howard Street  
Suite 700  
San Francisco, CA 94105  
415-543-4880  
Fax 415-543-5480

**PRC**

August 26, 1991

Carlene Merey  
Harding Lawson Associates  
7655 Redwood Blvd.  
P.O. Box 578  
Novato, CA 94948

18. 22 only

Received CTM  
Update Rec'd 9/4/91 CTM

Re: Data Validation Reports and Summaries, PA-16 and PA-18, Hunters Point  
Annex

Dear Ms. Merey,

Enclosed are your copies of the data validation reports and summaries for the semi-volatile and metals data. The report for the semi-volatiles is final.

The validation summaries are prepared to make the task of qualifying the data easier. The summaries include those problems which should be generally applied to the samples in the specified group, all PA-16 and PA-18 samples in this case. The summaries are followed by the validation reports prepared for individual samples.

If you have any questions, please contact Santiago Lee or me at 415/543-4880.

Sincerely,

*Thorsten Anderson*

Thorsten Anderson  
QA Chemist

## DATA VALIDATION SUMMARY

Samples Validated: 9105G589, 9105G592, 9106G601, 9106H592 and 9107X054  
Samples Applied To: All sample analyzed for areas PA-16 and PA-18  
Date Samples Collected: January 28 through February 14, 1991  
Matrices: Soil and water

Analysis: CLP Semi-volatiles

Date Validated: August 19, 1991  
QC Criteria Validated: Holding times, laboratory blanks, surrogate recoveries, matrix spike/matrix spike duplicate, instrument tunes, instrument response factors and percent differences, and internal standard areas and retention times

The data were validated according to EPA documents "Laboratory Data Validation Functional Guidelines for Evaluating Organic Analyses" (February 1988).

### COMMENTS

1. Tentatively identified compounds (TIC) were present in the laboratory blanks at concentrations of 200  $\mu\text{g/kg}$  to 10,000  $\mu\text{g/kg}$  for soil samples. The retention times of these TICs in the blanks were 5.02-5.30, 6.40-6.66, 17.20, 21.60, 23.37, 25.40, 27.37, 33.04, and 33.57 minutes. The laboratory blanks for water samples contained a TIC at 5.21 minutes with a concentration of 16 $\mu\text{g/L}$ .

- Any samples containing TICs labeled as "unknown" within 0.10 minutes of these retention times should be considered non-detected (U)

This problem should not have a major impact on the data since the TIC concentrations are always considered tentatively identified and estimated (NJ).

2. Other comments made in the validation reports apply only to individual samples or do not affect any data.

## QA/QC DATA VALIDATION REPORT

### 1.0 QA/QC Narrative

Site: Hunters Point Annex (CTO No. 0057)  
Laboratory: National Environmental Testing (NET)  
QA Validator: Christine Snyder and Donna Melvin  
Validation Date: August 21, 1991  
Batch No.: 9107X054  
Sample No.: 9107X054  
Analyses: Semivolatiles

QC Criteria Validated: Holding times, laboratory blanks, surrogate recoveries, matrix spike/matrix spike duplicate, initial and continuing calibration response factors and percent differences, internal standard areas and retention times, instrument tunes.

The data were validated according to EPA documents "Laboratory Data Validation Functional Guidelines for Evaluating Organic Analyses" (February 1988).

### COMMENTS

- 1 Due to blank contamination problems, the results for the following tentatively identified compounds (TIC) are considered non-detected and estimated (JNU) and usable for limited purposes only.
  - o TIC at approximate retention time 5.21 in sample 9107X054This compound was found in the laboratory blank at a concentration of 16 ug/L.
2. All quality control criteria, other than those discussed above, were met and are considered acceptable, all other results are considered valid and usable for all purposes.

## QA/QC DATA VALIDATION REPORT

### 1.0 QA/QC Narrative

Site: Hunters Point Annex (CTO No. 0057)

Laboratory: National Environmental Testing (NET)

QA Validator: Christine Snyder and Donna Melvin

Validation Date: August 17, 1991

Batch No.: 9105G589

Sample No.: 9105G589, 9105G592, 9106G601, 9106H592

Analyses: Semivolatiles

QC Criteria Validated: Holding times, laboratory blanks, surrogate recoveries, matrix spike/matrix spike duplicate, instrument tune, internal standard areas and retention times. Instrument calibrations response factors and percent differences.

The data were validated according to EPA documents "Laboratory Data Validation Functional Guidelines for Evaluating Organic Analyses" (February 1988).

### COMMENTS

1. Due to blank contamination problems, the results for the following tentatively identified compounds (TIC) are considered non detected and estimated (NJU) and usable for limited purposes only.

- o TIC at retention times 5.19, 5.21, 33.26 in sample 9105G589
- o TIC at retention times 5.05, 6.43, 25.01, 33.04 in samples 9105G592
- o TIC at retention times 5.10, 25.94, 33.36 in sample 9106G601
- o TIC at retention times 5.13, 5.15, in sample 9106H592

These TIC's were present in the blanks at concentrations 200 ug/kg to 10000 ug/kg.

2. Laboratory did not report the presence of a peak (greater than 10% of the nearest internal standard) at retention time 26.44 in sample 9105G592. The concentration of this tentatively identified compound is approximately 176 ug/Kg.
3. The matrix spike/matrix spike duplicate relative percent difference QC limit of 50% for 4-nitrophenol was exceeded for samples ~~ZZZZZ~~BMS/MSD (76%).
4. All quality control criteria, other than those discussed above, were met and are considered acceptable. All other results are considered valid and usable for all purposes.

## DATA VALIDATION SUMMARY

Samples Validated: 9105G589, 9105G592, 9106G601, 9106H592 and 9107X054  
Samples Applied To: All sample analyzed for areas PA-16 and PA-18  
Date Samples Collected: January 28 through February 14, 1991  
Matrices: Soil and water  
  
Analysis: CLP Metals (including molybdenum, mercury, and cyanide)  
  
Date Validated: August 24, 1991  
QC Criteria Validated: Holding times, laboratory blanks (ICB, CCB, PB), matrix spikes, matrix duplicates, initial and continuing calibration standard recoveries, ICP serial dilutions, and interference check samples

The data were validated according to the EPA document "Laboratory Data Validation Functional Guidelines for Evaluating Inorganic Analyses" (July 1988).

## COMMENTS

1. Common inorganic blank contaminants which affected results were beryllium (0.6  $\mu\text{g/L}$ ), sodium (623  $\mu\text{g/L}$ ), and molybdenum (7.1  $\mu\text{g/L}$ ). Please review the following report for specific information on amounts of contaminants found and samples qualified in NET batches 5849, 5863, 5957, 5975, and 6090.

- Samples with concentrations (in mg/kg) less than the amount found in the blanks (in  $\mu\text{g/L}$ ) were qualified non-detected and estimated (UJ).

Aluminum, antimony, arsenic, barium, beryllium, cadmium, calcium, cobalt, copper, iron, lead, magnesium, manganese, mercury, nickel, selenium, silver, sodium, vanadium, zinc, and molybdenum were all found in at least one inorganic laboratory blank at concentrations of -3.6 to 623  $\mu\text{g/L}$ .

The dilution factor for soil samples was taken into account for soil samples. The negative concentrations observed in some laboratory blanks were very small compared to the sample concentrations and detection limits when the dilution factor is taken into account.

2. Abnormally high concentrations of antimony were detected in the AB solution of the interference check sample. Antimony is not contained in the AB solution. This problem indicates the possibility of false positives in samples with concentrations of aluminum, calcium, magnesium (500,000  $\mu\text{g/L}$  each) and iron (200,000  $\mu\text{g/L}$ ) similar to those in the interference check sample. Samples 9106G601 and 9106H592 were not qualified because the concentrations of the interfering analytes were not at high level in the samples.

- All positive results for antimony are considered estimated (J) if the concentrations of aluminum, calcium, or magnesium are above 500,000  $\mu\text{g/L}$ , or the concentration of iron is above 200,000  $\mu\text{g/L}$ .

The sample results for antimony may be biased high under these conditions.

3. The laboratory reported mercury as non-detected (0.5 mg/kg detection limit) for samples 9106G601 and 9106H592. The raw data showed concentrations of 0.106 mg/kg for these samples. The laboratory should reconcile this difference. Other samples may be affected.
4. Other comments made in the validation reports apply only to individual samples or do not affect any sample results.



## QA/QC DATA VALIDATION REPORT

### 1.0 QA/QC Narrative

Site: Hunters Point Annex PA-18  
Laboratory: National Environmental Testing (NET)  
QA Validator: Cheryl Baggett  
Validation Date: August 22, 1991  
Batch No.: 9105G589  
Sample No.: 9105G589, 9105G592  
Analyses: Metals (including molybdenum and mercury) and cyanide  
QC Criteria Validated: Holding time, laboratory blanks, matrix spike/matrix spike duplicate recoveries, initial and continuing calibration blank and standard recoveries, laboratory control sample recoveries and interference check sample recoveries.

The data were validated according to EPA documents "Laboratory Data Validation Functional Guidelines for Evaluating Inorganic Analyses" (July 1988).

### COMMENTS

1. Due to accuracy problems, the results for the following analytes are considered estimates (J) and usable for limited purposes only.

- o Antimony in samples 9105G589 and 9105G592

The matrix spike recovery for antimony was 65% and the results for antimony are biased low.

2. The raw data for the last seven samples of the ICPAES analyses on 4/18/91 were omitted from the package. The final contract required detection limit standard, interference check solutions, and continuing calibration data cannot be verified. Results for aluminum, calcium, chromium, copper, and magnesium are affected.

3. Due to precision problems, the results for the following analytes are considered estimates (J) and usable for limited purposes only.

- o Aluminum and copper in all samples

The relative percent difference (RPD) for the following analytes exceeded the QC limits of 35% in the duplicate samples:

Analyte	RPD
aluminum	40.0
copper	85.5

4. The metals digestion logs submitted do not contain full sample names. The last two digits are omitted from the sample names. Also, there is no indication of batch number on the laboratory control sample or preparation blank. It is difficult to determine which control samples are associated with which samples.
5. All quality control criteria, other than those discussed above, were met and are considered acceptable. All other results are considered valid and usable for all purposes.

## QA/QC DATA VALIDATION REPORT

### Addendum to QA/QC Narrative for Batch No. 9105G589

Date: August 24, 1991

Analysis: CLP Metals (including molybdenum, mercury and cyanide)

QC Criteria Validated: Laboratory blanks (ICB, CCB, PB)

The data were validated according to the EPA document "Laboratory Data Validation Functional Guidelines for Evaluating Inorganic Analyses" (July 1988).

#### COMMENTS

1. Due to blank contamination problems, the results for the following analytes are considered non-detected (U).
  - Barium in sample 9105H583
  - Beryllium in samples 9105G586-9106G591, 9106G593-9105G596, 9105H579, 9105H582, 9105H585, and 9105H586
  - Sodium in samples 9105G585-9105G596, 9105H579-9105H583, 9105H585, and 9105H586
  - Molybdenum in samples 9105G585, 9105G587-9105G596, 9105H579-9105H582, 9105H585, and 9105H586

Antimony, barium, beryllium, cadmium, calcium, cobalt, copper, iron, magnesium, manganese, sodium, zinc, and molybdenum were found in the inorganic laboratory blanks at concentrations of -3.6 to 623.1 µg/L. Only samples with concentrations less than five times the amount found in the blanks were qualified.

The dilution factor for soil samples was taken into account for soil samples. The negative concentrations observed in some laboratory blanks were very small compared to the sample concentrations and detection limits when the dilution factor is taken into account.

## QA/QC DATA VALIDATION REPORT

### 1.0 QA/QC Narrative

Site: Hunters Point Annex PA-16, PA-18

Laboratory: National Environmental Testing (NET)

QA Validator: Thorsten Anderson, PRC

Validation Date: August 24, 1991

Batch No.: 9106G601

Sample No.: 9106G601 and 9106H592

Analysis: CLP Metals (including molybdenum, mercury, and cyanide)

QC Criteria Validated: Holding times, laboratory blanks (ICB, CCB, PB), matrix spikes, matrix duplicates, initial and continuing calibration standard recoveries, ICP serial dilutions, and interference check samples

The data were validated according to the EPA document "Laboratory Data Validation Functional Guidelines for Evaluating Inorganic Analyses" (July 1988).

### COMMENTS

1. Due to blank contamination problems, the results for the following analytes are considered non-detected (U).

- Cobalt in samples 9105G598, and 9106G604
- Molybdenum in samples 9105G597, 9105G599-9105G601, 9106G602, 9106G603, 9106H587-9106H594, and 9106H596

Aluminum, arsenic, barium, cadmium, calcium, cobalt, copper, iron, lead, magnesium, nickel, selenium, sodium, vanadium, zinc, and molybdenum were found in the inorganic laboratory blanks at concentrations of -3.6 to 89.6  $\mu\text{g/L}$ . Only samples with concentrations less than five times the amount found in the blanks were qualified.

The dilution factor for soil samples was taken into account for soil samples. The negative concentrations observed in some laboratory blanks were very small compared to the sample concentrations and detection limits when the dilution factor is taken into account.

2. Abnormally high concentrations of antimony were detected in the AB solution of the interference check sample. Antimony is not contained in the AB solution. This problem indicates the possibility of false positives in samples with concentrations of aluminum, calcium, magnesium (500,000  $\mu\text{g/L}$  each) and iron (200,000  $\mu\text{g/L}$ ) similar to those in the interference check sample. No samples are qualified because the concentrations of these analytes were not at this level in samples 9106G601 and 9106H592.
3. Due to accuracy problems, the results for the following analytes are considered estimates (J) and usable for limited purposes only.

- Antimony and selenium in samples 9106G601 and 9106H592

The matrix spike recoveries for antimony and selenium were 8.0% and 44.6% in this batch of samples (75-125% QC limit). The detected results for antimony are biased low. The detection limits for selenium are also biased low.

4. Due to serial dilution problems, the results for the following analytes are considered estimated (J) and usable for limited purposes only.

- Zinc, calcium and manganese in samples 9106G601 and 9106H592

Percent differences of 10.7-14.8%, 18.2% and 22.5% were found for zinc, calcium and manganese, respectively, in the ICP serial dilution analysis (10% QC limit).

5. The laboratory reported mercury as non-detected (0.5 mg/kg detection limit) for samples 9106G601 and 9106H592. The raw data showed concentrations of 0.106 mg/kg for these samples. The laboratory should reconcile this difference.

6. Due to holding time problems, the result for the following sample is considered an estimate (J) and usable for limited purposes only.

- Mercury in sample 9106G601

Mercury was analyzed 1 day over the 28 day holding time in this sample.

7. All quality control criteria, other than those discussed above, were met and are considered acceptable. All other results are considered valid and usable for all purposes.

## QA/QC DATA VALIDATION REPORT

### 1.0 QA/QC Narrative

Site: Hunters Point Annex PA-16, PA-18

Laboratory: National Environmental Testing (NET)

QA Validator: Thorsten Anderson, PRC

Validation Date: August 24, 1991

Batch and Sample No.: 9107X054

Analysis: CLP Metals (including molybdenum, mercury, and cyanide)

QC Criteria Validated: Holding times, laboratory blanks (ICB, CCB, PB), matrix spikes, matrix duplicates, initial and continuing calibration standard recoveries, ICP serial dilutions, and interference check samples

The data were validated according to the EPA document "Laboratory Data Validation Functional Guidelines for Evaluating Inorganic Analyses" (July 1988).

### COMMENTS

1. Due to blank contamination problems, the results for the following analytes are considered non-detected (U).
  - Copper in samples 9107X054 and 9107X057
  - Silver in sample 9107X054
  - Zinc and molybdenum in sample 9107X057

Antimony, beryllium, copper, iron, lead, manganese, selenium, silver, sodium, zinc, and molybdenum were found in the inorganic laboratory blanks at concentrations of -1.8 to 623.1 µg/L. Only samples with concentrations less than five times the amount found in the blanks were qualified.
2. Due to precision problems, the results for the following analytes are considered estimates (J) and usable for limited purposes only.
  - Antimony and zinc in sample 9107X054

The relative percent differences (RPD) for zinc was 112.8% (20% QC limit). Antimony was detected in the duplicate only with an absolute difference of greater than the CRDL.
3. Due to accuracy problems, the results for the following analytes are considered estimates (J) and usable for limited purposes only.
  - Selenium and thallium in sample 9107X054

The matrix spike recoveries for selenium and thallium were 74.0% and 68.2% in this batch of samples (75-125% QC limit). The detection limits for selenium and thallium are biased low.
4. Due to serial dilution problems, the results for the following analytes are considered estimated (J) and usable for limited purposes only.
  - Calcium and manganese in samples 9107X054

Percent differences of 18.2% and 22.5% were found for calcium and manganese, respectively, in the ICP serial dilution analysis (10% QC limit).

5. All quality control criteria, other than those discussed above, were met and are considered acceptable. All other results are considered valid and usable for all purposes.

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## QUALIFIED SAMPLES

[illegible]

[1] = laboratory blank, e.g. ICB,CCB,PB,etc.

## 3.3 LABORATORY BLANK REVIEW

## C INORGANICS

Page 2 of 9

Laboratory NET  
 Sample Delivery Group Week 11  
 QA Reviewer/Firm TA/PRC  
 Review Date FAP 8/24/91  
 Sample Matrix Soil

## QUALIFIED SAMPLES

LABORATORY BLANK SAMPLE NUMBER & detected analytes	Blank Type[1]	Blank Concentration	IDL	590 <u>91056600</u> Sample Number	591 <u>91056601</u> Sample Number	592 <u>91056602</u> Sample Number	593 <u>91056603</u> Sample Number	594 <u>91056604</u> Sample Number
				Value/Qualifier	Value/Qualifier	Value/Qualifier	Value/Qualifier	Value/Qualifier
Antimony	CCB	31.6	25	37.2	23.4	53.5	40.4	37.5
Barium	CCB	6.2	3.0	—	—	—	—	—
Beryllium	ICB	0.6	0.5	0.334	0.334	0.86	0.484	0.404
Cadmium	CCB	-3.6	3.0	—	—	—	—	—
Calcium	PB	89.6	93.0	—	—	—	—	—
Copper	CCB	5.5	3.0	12.4	20.7	—	12.1	—
Iron	PB	22.45	20.0	—	—	—	—	—
Magnesium	PB	51.28	84.0	—	—	—	—	—
Manganese	PB	1.82	1.8	—	—	—	—	—
Sodium	PB	623.1	320.0	334 u	850 u	364 u	270 u	408 u
Zinc	PB	10.1	3.0	31.1	—	—	28.1	31.7
Molybdenum	PB	7.07	5.1	1.7 u	1.1 u	3.9 u	3.0 u	4.6 u

[1] = laboratory blank, e.g. ICB,CCB,PB,etc.



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### QUALIFIED SAMPLES

[1] = laboratory blank, e.g. ICB,CCB,PB,etc.

### 3.3 LABORATORY BLANK REVIEW

Page 4 of 9

Laboratory NET  
Sample Delivery Group Week 11  
QA Reviewer/Firm TA/RC  
Review Date FAR 8/24/91  
Sample Matrix Soil

### QUALIFIED SAMPLES

LABORATORY BLANK  
SAMPLE NUMBER  
& detected analytes

Blank	Blank
Type[1]	Concentration

IDL

9105H582  
Sample Number

910SH583  
Sample Number

91054585  
Sample Number

9105 H586  
Sample Number

**Sample Number**

Value/Qualifier

Value/Qualifier

Value/Qualifier

Value/Qualifier

Value/Qualifier

[illegible]

[1] = laboratory blank, e.g. ICB,CCB,PB,etc.

3.3 LAF TATORY BLANK REVIEW  
CLP INORGANICS

Page 5 of 9

Laboratory NET  
Sample Delivery Group Week 12  
QA Reviewer/Firm TA/PRC  
Review Date 8/23/91  
Sample Matrix Soil

QUALIFIED SAMPLES

LABORATORY BLANK SAMPLE NUMBER & detected analytes	Blank Type[1]	Blank Concentration	IDL ( $\mu\text{g/L}$ )	91056597	91056598	91056599	91056600	91056601
				Sample Number Value/Qualifier	Sample Number Value/Qualifier	Sample Number Value/Qualifier	Sample Number Value/Qualifier	Sample Number Value/Qualifier
Aluminum	PB	27.4	120	—	—	—	—	—
Arsenic	PB	-0.6	3.0	—	—	—	—	—
Barium	CCB	6.4	3.0	—	—	—	—	—
Cadmium	CCB	-3.6	3.0	—	—	—	—	—
Calcium	PB	89.59	93.0	—	—	—	—	—
Cobalt	CCB	7.3	6.0	12.9	5.6 $\mu$	25.7	—	32.3
Copper	CCB	5.1	3.0	—	17.4	—	—	—
Iron	PB	5.4	20.0	—	—	—	—	—
Lead	ICB	-2.3	0.6	—	—	—	—	—
Magnesium	PB	51.3	84.0	—	—	—	—	—
Nickel	CCB	7.02	14.0	—	27.7	—	—	—
Selenium	CCB	-1.8	1.5	—	—	—	—	—
Sodium	PB	89.4	320	—	259	—	—	—
Vanadium	CCB	6.7	6.0	28.3	20.90	—	—	—
Zinc	PB	4.61	3.0	—	—	—	—	—
Molybdenum	ICB	6.3	5.1	1.2 $\mu$	—	4.4 $\mu$	1.3 $\mu$	3.6 $\mu$

[1] = laboratory blank, e.g. ICB,CCB,PB,etc.

### 3.3 LAB 'ATORY BLANK REVIEW CL- INORGANICS

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Laboratory NET

Sample Delivery Group Week 12

QA Reviewer/Firm TA/PRC

Review Date 8/23/91

Sample Matrix soil

#### QUALIFIED SAMPLES

LABORATORY BLANK SAMPLE NUMBER & detected analytes	Blank Type[1]	Blank Concentration	IDL ( $\mu\text{g/L}$ )	9106G602 Sample Number	9106G603 Sample Number	9106G604 Sample Number	9106H587 Sample Number	9106H588 Sample Number
				Value/Qualifier	Value/Qualifier	Value/Qualifier	Value/Qualifier	Value/Qualifier
Aluminum	PB	27.4	120	—	—	—	—	—
Arsenic	PB	-0.6	3.0	—	—	—	—	—
Barium	CCB	6.4	3.0	—	—	11.7	—	—
Cadmium	CCB	-3.6	3.0	—	—	—	—	—
Calcium	PB	89.59	930	—	—	—	—	—
Cobalt	CCB	7.3	6.0	37.7	12.5	6.7 u	33.6	38.1
Copper	CCB	5.1	3.0	—	—	6.4	—	—
Iron	PB	5.4	20.0	—	—	—	—	—
Lead	ICB	-2.3	0.6	—	—	—	—	—
Magnesium	PB	51.3	84.0	—	—	—	—	—
Nickel	CCB	7.02	14.0	—	—	32.4	—	—
Selenium	CCB	-1.8	1.5	—	—	—	—	—
Sodium	PB	89.4	320	—	—	—	—	—
Vanadium	CCB	6.7	6.0	—	—	12.9	—	—
Zinc	PB	4.61	3.0	—	—	11.0	—	—
Molybdenum	ICB	6.3	5.1	4.4 u	5.6 u	—	2.9 u	4.0 u

[1] = laboratory blank, e.g. ICB,CCB,PB,etc.

3.3 LAB ATORY BLANK REVIEW  
CL. INORGANICS

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Laboratory NET

Sample Delivery Group Week 12

QA Reviewer/Firm TA/PRL

Review Date 8/23/91

Sample Matrix Soil

QUALIFIED SAMPLES

LABORATORY BLANK SAMPLE NUMBER & detected analytes	Blank Type[1]	Blank Concentration	IDL (ug/L)	9106H589	9106H590	9106H591	9106H592	9106H593
				Sample Number	Sample Number	Sample Number	Sample Number	Sample Number
				Value/Qualifier	Value/Qualifier	Value/Qualifier	Value/Qualifier	Value/Qualifier
Aluminum	PB	27.4	120	—	—	—	—	—
Arsenic	PB	-0.6	3.0	—	—	—	—	—
Barium	CCB	6.4	3.0	—	—	—	—	—
Cadmium	CCB	-3.6	3.0	—	—	—	—	—
Calcium	PB	89.59	930	—	—	—	—	—
Cobalt	CCB	7.3	6.0	—	—	32.7	—	23.1
Copper	CCB	5.1	3.0	—	—	—	—	—
Iron	PB	5.4	20.0	—	—	—	—	—
Lead	ICB	-2.3	0.6	—	—	—	—	—
Magnesium	PB	51.3	84.0	—	—	—	—	—
Nickel	CCB	7.02	14.0	—	—	—	—	—
Selenium	CCB	-1.8	1.5	—	—	—	—	—
Sodium	PB	89.4	320	—	—	—	—	285
Vanadium	CCB	6.7	6.0	—	—	—	—	—
Zinc	PB	4.61	3.0	—	—	—	—	—
Molybdenum	ICB	6.3	51	4.0u	3.7u	4.4u	3.6u	3.6u

[1] = laboratory blank, e.g. ICB,CCB,PB,etc.

### 3.3 LAF TATORY BLANK REVIEW CLP INORGANICS

Page 8 of 9

Laboratory NET  
Sample Delivery Group Week 12  
QA Reviewer/Firm TA/PRC  
Review Date 8/23/91  
Sample Matrix soil

#### QUALIFIED SAMPLES

LABORATORY BLANK SAMPLE NUMBER & detected analytes	Blank Type[1]	Blank Concentration	IDL ( $\mu\text{g/L}$ )	9106H594	9106H595	9106H596	<del>9106H598</del>	
				Sample Number	Sample Number	Sample Number	Sample Number	Sample Number
				Value/Qualifier	Value/Qualifier	Value/Qualifier	Value/Qualifier	Value/Qualifier
Aluminum	PB	27.4	120	—	—	—		
Arsenic	PB	0.6	3.0	—	—	—		
Barium	CCB	6.4	3.0	—	—	—		
Cadmium	CCB	3.6	3.0	—	—	—		
Calcium	PB	89.59	930	—	—	—		
Cobalt	CCB	7.3	6.0	—	11.0	—		
Copper	CCB	5.1	3.0	—	—	—		
Iron	PB	5.4	20.0	—	—	—		
Lead	ICB	2.3	0.6	—	—	—		
Magnesium	PB	51.3	84.0	—	—	—		
Nickel	CCB	7.02	14.0	—	—	—		
Selenium	CCB	1.8	1.5	—	—	—		
Sodium	PB	89.4	320	—	—	—		
Vanadium	CCB	6.7	6.0	—	—	—		
Zinc	PB	4.61	3.0	—	—	—		
Molybdenum	ICB	6.3	5.1	5.6 u	8.2	6.1 u		

[1] = laboratory blank, e.g. ICB,CCB,PB,etc.

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### QUALIFIED SAMPLES

[1] = laboratory blank, e.g. ICB,CCB,PB,etc.

**QA/QC DATA VALIDATION REPORT****1.0 QA/QC Narrative**

**Site:** Hunters Point Annex: PA-16, PA-18

**Laboratory:** National Environmental Testing (NET)

**QA Validator:** Christine Snyder

**Validation Date:** September 1, 1991

**Batch No.:** 9105G589

**Sample No.:** 9105G589, 9105G592, 9106G601, 9106H592, 9107X054

**Analyses:** TPH-diesel, TPH-gas, pH, oil and grease, percent solids

**Collection Dates:** January 28, 1991, January 30, 1991, February 5, 1991, February 6, 1991, February 12, 1991

**QC Criteria Validated:** Holding time, laboratory blanks, surrogate recoveries, matrix spike/matrix spike duplicate, matrix duplicate, blank spike, initial and continuing calibrations.

The data were validated according to EPA documents "Laboratory Data Validation Functional Guidelines for Evaluating Organic Analyses" (February 1988) and "Laboratory Data Validation Functional Guidelines for Evaluating Inorganic Analysis" (July 1988)

**COMMENTS:**

1. The percent recovery for the blank spike in the TPH diesel for QC Batch G1301151 on 1-31-91 (File ID A30118) was below the limits of 50-150% recovery at 15%.
2. Due to surrogate recovery problems, the results for the following analytes are considered estimated (J) and usable for limited purposes only.
  - o TPH-gas in samples 9106H592 and 9106G601

The following table lists the surrogates exceeding the QC limits of 50-150% recovery.

<u>Sample #</u>	<u>% Recovery</u>
9106H592	26
9106G601	48

3. In TPH-diesel sample 9106H592 petroleum hydrocarbon heavier than diesel was reported to be present but was not quantitated by the laboratory. An approximate concentration should have been reported for the hydrocarbon peak in this sample.
4. The calculations reported by the laboratory were difficult to verify using the data submitted.
5. All quality control criteria, other than those discussed above, were met and are considered acceptable. All other results are considered valid and usable for all purposes.



**Appendix E**  
**HEALTH RISK EVALUATION**  
**(PA-16)**

## LIST OF TABLES

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Table E-1	Screening-Level Analysis of Soils at PA-16
Table E-2	Intake Assumptions and Methods for Estimating Health-Based Values
Table E-3	EPA-Established Toxicity Information
Table E-4	Estimated Health-Based Values for Residents
Table E-5	Potential Chemicals of Concern at PA-16

## APPENDIX E

### HEALTH RISK EVALUATION (PA-16)

The following sections describe the methods used to evaluate potential human health impacts associated with 3 PNAs and 10 trace metals detected either above the estimated upper limit of background concentrations (*HLA, 1990*) in soil samples from PA-16 or for which background concentrations have not been estimated, as well as the results of a screening-level health risk evaluation performed for these chemicals. All quantitative methods are in accordance with guidelines established by the U.S. Environmental Protection Agency (*EPA, 1991*).

The 13 chemicals, the arithmetic mean of measured concentrations, and maximum concentrations are presented in Table E-1. Means for non-detects were calculated assuming one-half the detection limit. Upper limit of background concentrations estimated from previous background sampling investigations at HPA (*HLA, 1990*) are also presented. RCRA soil action levels (*EPA, 1990*), and California Department of Health Services (DHS) soil ingestion screening levels and soil applied action levels (*AALs; DHS, 1990a, 1991*) are also presented for each chemical in Table E-1. It should be noted that the DHS screening levels and the RCRA action levels listed in Table E-1 are only guidelines for evaluating soil levels detected at sites. In addition, the DHS screening levels are under review; exceedances of screening levels should not be interpreted as an absolute determination of the need for further study (*DHS, 1990b*). DHS has not provided final screening levels to date. AALs are health-based criteria developed according to DHS methods (*DHS, 1986*). Chemical concentrations above these RCRA or DHS screening or AAL levels may warrant further

these values are not considered to be either site-specific, health-based target cleanup levels (TCLs), or in this case conservative health-based levels for carcinogens (HBLc) and noncarcinogens (HBLn) based on a hypothetical future onsite residential scenario. For this reason, site-specific HBLc and HBLn values were developed for the 13 chemicals.

To estimate HBLs, the potential human health effects to a residential population comprised of children and adults exposed to the site chemicals via ingestion of and dermal contact with soil were considered. The calculated HBL values were compared with the detected values and the soil levels presented in Table E-1.

In calculating HBLs for soil, quantitative risk assessment methods were employed to estimate a soil concentration considered protective of human health. The equations and assumptions used to estimate HBLc and HBLn values for children and adults are presented in Table E-2. Exposure scenarios, human intake assumptions, and toxicity values used in the calculation of HBLs are consistent with EPA methods (EPA, 1989,1991). Conservative human intake assumptions (e.g., 95th percentile skin surface areas) for children and adults (Table E-2) were used in conjunction with EPA toxicity values for noncarcinogens (i.e., reference doses [RfDs]) and carcinogens (i.e., slope factors [SFs]) to estimate HBLs that are expected to be protective of human health. RfDs and SFs used to evaluate oral, inhalation, and dermal routes of exposures are presented in Table E-3. For each of the site chemicals with available RfDs, the HBLn values were estimated so that allowable daily intakes (dose) equate to the acceptable daily intakes (RfDs). For each of the site chemicals with available SFs, the HBLc values were estimated so that the carcinogenic health risks do not exceed  $1 \times 10^{-6}$  (i.e., 1 in

1,000,000 excess lifetime cancer risk). Estimated HBL values for hypothetical onsite residents (children and adults) are summarized in Table E-4.

Based on this analysis and the HBLs estimated for the chemicals listed on Table E-4, antimony and arsenic may be chemicals of potential concern for Site PA-16.

## LITERATURE CITED

- Harding Lawson Associates (HLA), 1990. *Background Sampling Plan, Naval Station Treasure Island, Hunters Point Annex, San Francisco, California*. October.
- State of California Department of Health Services (DHS), 1990a. *The Interim Guidance Preparation of a Preliminary Endangerment Assessment Report*. June.
- State of California Department of Health Services (DHS), 1991. *Applied Action Levels List 91-1, Department of Toxic Substances Control*. July 1.
- \_\_\_\_\_, 1990b. Telephone conversation with Toxic Substances Control Program, Sacramento. August.
- \_\_\_\_\_, 1986. *The California Site Mitigation Decision Tree Manual*, Toxic Substances Control Division. May.
- Sager, S.L., and M.K. Jones, 1991. *Calculation of Lead Cleanup Levels in the Absence of Toxicity Values*. HMCRI Research and Development Conference, Anaheim, California, February.
- U.S. Environmental Protection Agency (EPA), 1989. *Risk Assessment Guidance for Superfund, Volume I, Human Health Evaluation Manual (Part A), Interim Final*. Office of Emergency and Remedial Response, Washington, D.C. 20460, EPA/540/1-89/002, December.
- \_\_\_\_\_, 1990. *Corrective Action for Solid Waste Management Units (SWMUs) at Hazardous Waste Management Facilities*. Fed. Reg. 55, 30798-30884, July.
- \_\_\_\_\_, 1991. *Human Health Evaluation Manual, Supplemental Guidance: "Standard Default Exposure Factors"*, OSWER Directive 9285.6-03. March 25.

Table E-1. Screening Level Analysis of Soils at PA-16

CHEMICALS	Soil Sampling Results /a/		Estimated Upper Limit of Background Concentration /b/ (mg/kg)	DHS Soil Ingestion Screening Level /c/		DHS AAL (mg/kg) /d/	Soil RCRA Level /e/ (mg/kg)
	Arithmetic Mean (mg/kg)	Maximum (mg/kg)		Child (mg/kg)	Adult (mg/kg)		
<u>ORGANICS</u>							
Phenanthrene	0.20	0.29	--	500000.0	900.0	100	--
Fluoranthene	0.21	0.46	--	500000.0	900.0	--	--
Pyrene	0.21	0.44	--	500000.0	900.0	--	--
<u>METALS</u>							
Antimony	65.59	92.10	--	0.9	500.0	--	30.0
Arsenic	5.66	15.70	7.00	2.0	1000.0	--	80.0
Barium	172.26	443.00	200.00	100.0	70000.0	--	4000.0
Cadmium	7.42	14.00	2.10	2.0	1000.0	--	40.0
Lead	8.84	40.40	12.00	500.0	2000.0	--	--
Mercury	0.08	0.22	--	0.7	400.0	--	20.0
Molybdenum	2.18	8.20	--	--	--	--	--
Selenium	0.59	0.91	--	7.0	4000.0	--	--
Silver	0.59	1.80	--	7.0	4000.0	--	200.0
Zinc	62.99	116.00	100.00	400.0	200000.0	--	--

/a/ From: Eighteen soil samples collected at Site PA-16 at all depths.

/b/ From: HLA, 1990.

/c/ From: DHS, 1990a.

/d/ From: DHS, 1991.

/e/ From: EPA, 40 CFR, 1990.

Note: Dashes (--) indicate information not available or calculable.

Table E-2. Intake Assumptions and Methods for Estimating Health-Based Values /a/

Child (5 years old)	Abbreviation	Value
Exposure Duration (years)	ED1	5
Exposure Duration (days/yr)	ED2	350
Ingestion Rate (mg/day)	IR	200
Oral Absorption Factor (percent)	OAF	100%
Dermal Surface Area (cm <sup>2</sup> /day)	DSA	4908 95th percentile skin surface area comprising head, hands, legs, arms, feet
Soil Adherence Factor (mg/cm <sup>2</sup> )	SAF	0.5
Dermal Absorption Factor (percent)	DAF	1% for metals; 100% for organics
Body Weight (kg)	BW	13
Averaging Time for Carcinogens (days)	ATc	365 days/year x 70 years
Averaging Time for Noncarcinogens (days)	ATn	365 days/year x 5 years
Adult (70 years old)		
Exposure Duration (years)	ED1	30
Exposure Duration (days)	ED2	365
Ingestion Rate (mg/day)	IR	100
Oral Absorption Factor (percent)	OAF	100%
Dermal Surface Area (cm <sup>2</sup> /day)	DSA	6839 95th percentile skin surface area comprising head, hands, lower legs, lower arms
Soil Adherence Factor (mg/cm <sup>2</sup> )	SAF	0.5
Dermal Absorption Factor (percent)	DAF	1% for metals; 100% for organics
Body Weight (kg)	BW	70
Averaging Time for Carcinogens (days)	ATc	365 days x 70 years
Averaging Time for Noncarcinogens (days)	ATn	365 days x 30 years

Health Based Level for Carcinogens (HBLc) estimated based on the following equation and assumptions stated above:

$$HBLc = \frac{1 \times 10^{-6} \times BW \times ATc}{SF \times ED1 \times ED2 \times \{(IR \times OAF) + (DSA \times SAF \times DAF)\} \times 10^{-6} \text{ kg/mg}}$$

Note: SF = Oral slope factor from EPA, IRIS, 1991; HEAST, 1991  
 $1 \times 10^{-6}$  = Assumed target risk of  $1 \times 10^{-6}$

Health Based Level for Noncarcinogens (HBLn) estimated based on the following equation and assumptions stated above:

$$HBLn = \frac{RfD \times BW \times ATn}{HQ \times ED1 \times ED2 \times \{(IR \times OAF) + (DSA \times SAF \times DAF)\} \times 10^{-6} \text{ kg/mg}}$$

Note: RfD = Reference Dose from EPA  
 HQ = Assumed target hazard quotient of 1.0

/a/ Methods consistent with EPA, 1989, 1990, 1991.



Table E-3. EPA-Established Toxicity Information

CHEMICALS	Weight of Evidence /a/	Inhalation Toxicity Values /a/		Oral/Dermal Toxicity Values /a/	
		RfD (mg/kg/day)	SF (mg/kg/day)^-1	RfD (mg/kg/day)	SF (mg/kg/day)^-1
<u>ORGANICS</u>					
Phenanthrene	D	--	--	4.00E-03 /b/	--
Fluoranthene	D	--	--	4.00E-02	--
Pyrene	D	--	--	3.00E-02	--
<u>METALS</u>					
Antimony	NC	--	--	4.00E-04	--
Arsenic	A	--	5.00E+01	1.00E-03	1.75E+00
Barium	NC	1.00E-04	--	7.00E-02	--
Cadmium	B1	--	6.10E+00	5.00E-04	--
Lead	B2	--	--	--	--
Mercury	D	8.57E-05	--	3.00E-04	--
Molybdenum	NC	--	--	4.00E-03	--
Selenium	D	--	--	--	--
Silver	D	--	--	3.00E-03	--
Zinc	D	--	--	2.00E-01	--

/a/ From: EPA, IRIS, 1991; EPA, HEAST, 1991; A = human carcinogen, B1 = limited evidence of human carcinogenicity, B2 = probable human carcinogen, D = not classified as human carcinogen, NC = noncarcinogen.

/b/ In the absence of an established toxicity value, assumed equivalent to toxicity of naphthalene, a representative PNA for noncarcinogenic PNAs.

Note: Dashes (--) indicate information not available or calculable.

Table E-4. Estimated Health-Based Values for Residents /a/

CHEMICALS	HBLc		HBLn	
	Child (mg/kg)	Adult (mg/kg)	Child (mg/kg)	Adult (mg/kg)
<b>ORGANICS</b>				
Phenanthrene	--	--	20	83
Fluoranthene	--	--	204	830
Pyrene	--	--	153	622
<b>METALS</b>				
Antimony	--	--	24	218
Arsenic	0.48	0.73	60	544
Barium	--	--	4226	38079
Cadmium	--	--	30	272
Lead /b/	--	--	--	--
Mercury	--	--	18	163
Molybdenum	--	--	242	2176
Selenium	--	--	--	--
Silver	--	--	181	1632
Zinc	--	--	12075	108797

/a/ See Table E-2 for explanation.

/b/ Acceptable daily blood levels based on similar intake assumptions estimated and 4200 for children and adults, respectively (Sager and Jones, 1991).

Note: Dashes (--) indicate information not available or calculable.

Table E-5. Potential Chemicals of Concern at Site PA-16 /a/

CHEMICALS	Comments
<u>ORGANICS</u>	
Phenanthrene	Not a health concern at levels detected
Fluoranthene	Not a health concern at levels detected
Pyrene	Not a health concern at levels detected
<u>METALS</u>	
Antimony	Above PEA levels for child and adult, and HBLn level for child (mean & maximum)
Arsenic	Above PEA levels for child, and HBLc level for child and adult (mean & maximum)
Barium	Not a health concern at levels detected
Cadmium	Above PEA levels for child; not a health concern at levels detected
Lead	Not above acceptable blood lead levels (Sager and Jones, 1990)
Mercury	Not a health concern at levels detected
Molybdenum	Not a health concern at levels detected
Selenium	Not a health concern at levels detected
Silver	Not a health concern at levels detected
Zinc	Not a health concern at levels detected

/a/ See Table E-2 for explanation.

**SITE INSPECTIONS  
SITES PA-16 AND PA-18 AND  
REMEDIAL INVESTIGATION WORK PLAN: SITE PA-18  
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